



<i>flowANPC 1 split</i>	1500 V / 8 mΩ
<div style="background-color: #eee; padding: 5px; margin-bottom: 5px;">Features</div> <ul style="list-style-type: none"> Split Advanced NPC topology Ultra-high switching frequency with SiC MOSFETs Split topology for better thermal performance No x-conduction at high frequencies 	<div style="background-color: #eee; padding: 5px; margin-bottom: 5px;">flow 1 12 mm housing</div> <div style="display: flex; justify-content: space-around; align-items: center;"> </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> LC59F36T LC69F36T </div>
<div style="background-color: #eee; padding: 5px; margin-bottom: 5px;">Target applications</div> <ul style="list-style-type: none"> Solar Inverters 	<div style="background-color: #eee; padding: 5px; margin-bottom: 5px;">Schematic</div> <div style="display: flex; justify-content: space-around; align-items: center;"> </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> LC59F36T LC69F36T </div>
<div style="background-color: #eee; padding: 5px; margin-bottom: 5px;">Types</div> <ul style="list-style-type: none"> 10-PG12NAB008MR02-LC59F36T 10-PG12NAC008MR02-LC69F36T 	

Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
AC Switch				
Drain-source voltage	V_{DSS}		1200	V
Drain current	I_D	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	139	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	685	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	279	W
Gate-source voltage	V_{GSS}		-4/22	V
Maximum Junction Temperature	T_{jmax}		175	°C



Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
AC Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	72	A
Repetitive peak forward current	I_{FRM}		252	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	183	W
Maximum junction temperature	T_{jmax}		175	°C
Neutral Point Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	130	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	232	W
Gate-emitter voltage	V_{GES}		±20	V
Maximum junction temperature	T_{jmax}		175	°C
Neutral Point Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	97	A
Repetitive peak forward current	I_{FRM}		300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	151	W
Maximum junction temperature	T_{jmax}		175	°C
Neutral Point Switch Prot. Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	21	A
Surge (non-repetitive) forward current	I_{FSM}	50 Hz Single Half Sine Wave $T_j = 150\text{ °C}$	65	A
Surge current capability	I^2t	$t_p = 10\text{ ms}$	21	A ² s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	64	W
Maximum junction temperature	T_{jmax}		175	°C



Vincotech

Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
DC-Link Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	130	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	232	W
Gate-emitter voltage	V_{GES}		±20	V
Maximum junction temperature	T_{jmax}		175	°C
DC-Link Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	72	A
Repetitive peak forward current	I_{FRM}		200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	122	W
Maximum junction temperature	T_{jmax}		175	°C
DC-Link Switch Prot. Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	72	A
Repetitive peak forward current	I_{FRM}		200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	122	W
Maximum junction temperature	T_{jmax}		175	°C
Capacitor (GS)				
Maximum DC voltage	V_{MAX}		25	V
Operation Temperature	T_{op}		-55...+125	°C



Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
-----------	--------	-----------	-------	------

Module Properties

Thermal Properties

Storage temperature	T_{stg}		-40...+125	°C
Operation temperature under switching condition	T_{top}		-40...(T _{max} - 25)	°C

Isolation Properties

Isolation voltage	V_{isol}	DC Test Voltage* $t_p = 2\text{ s}$	6000	V
Creepage distance			min. 12,7	mm
Clearance			8,33	mm
Comparative Tracking Index	CTI		≥ 600	

*100 % tested in production



Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		V_{GS} [V]	V_{GE} [V] V_{GS} [V]	V_{DS} [V] V_{DS} [V]	I_C [A] I_D [A]	I_F [A]	T_j [°C]	Min	Typ		Max

AC Switch

Static

Drain-source on-state resistance	$r_{DS(on)}$	18		100	25 125 150		8 11 12	10	mΩ
Gate-source threshold voltage	$V_{GS(th)}$		10	0,05	25	2,7		5,6	V
Gate to Source Leakage Current	I_{GSS}	-4/22	0		25			±500	nA
Zero Gate Voltage Drain Current	I_{DSS}	0	1200		25			50	μA
Internal gate resistance	r_g						1,4		Ω
Gate charge	Q_g						535		nC
Gate to source charge	Q_{GS}	18	600	100	25		110		
Gate to drain charge	Q_{GD}						205		
Short-circuit input capacitance	C_{iss}	$f = 1$ MHz					6685		pF
Short-circuit output capacitance	C_{oss}		0	800	25		380		
Reverse transfer capacitance	C_{rss}						135		

Reverse Diode Static

Diode forward voltage	V_{SD}	0		100	25		3,2		V
-----------------------	----------	---	--	-----	----	--	-----	--	---

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)					0,34		K/W
-------------------------------------	---------------	---------------------------------------	--	--	--	--	------	--	-----

AC Diode

Static

Forward voltage	V_F			60	25 125		1,63 2,04	1,7	V
Reverse leakage current	I_R		1200		25			1200	μA

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)					0,52		K/W
-------------------------------------	---------------	---------------------------------------	--	--	--	--	------	--	-----



Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max		

AC Real Open configuration

Switch Dynamic

Parameter	Symbol	Conditions	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Turn-on delay time	$t_{d(on)}$	$R_{gon} = 2 \Omega$ $R_{goff} = 2 \Omega$	-2 / 18	600	100	25		49		ns
						125		41		
						150		39		
Rise time	t_r	$R_{gon} = 2 \Omega$ $R_{goff} = 2 \Omega$	-2 / 18	600	100	25		18		ns
						125		15		
						150		17		
Turn-off delay time	$t_{d(off)}$	$R_{gon} = 2 \Omega$ $R_{goff} = 2 \Omega$	-2 / 18	600	100	25		133		ns
						125		145		
						150		146		
Fall time	t_f	$R_{gon} = 2 \Omega$ $R_{goff} = 2 \Omega$	-2 / 18	600	100	25		16		ns
						125		12		
						150		13		
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 0,8 \mu C$ $Q_{tFWD} = 0,7 \mu C$ $Q_{tFWD} = 0,7 \mu C$	-2 / 18	600	100	25		2,18		mWs
						125		2,02		
						150		2,05		
Turn-off energy (per pulse)	E_{off}	$Q_{tFWD} = 0,8 \mu C$ $Q_{tFWD} = 0,7 \mu C$ $Q_{tFWD} = 0,7 \mu C$	-2 / 18	600	100	25		0,929		mWs
						125		1,28		
						150		1,29		

Diode Dynamic

Parameter	Symbol	Conditions	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Peak recovery current	I_{RRM}	$di/dt = 5202 A/\mu s$ $di/dt = 7639 A/\mu s$ $di/dt = 7755 A/\mu s$	-2 / 18	600	100	25		24		A
						125		55		
						150		55		
Reverse recovery time	t_{rr}	$di/dt = 5202 A/\mu s$ $di/dt = 7639 A/\mu s$ $di/dt = 7755 A/\mu s$	-2 / 18	600	100	25		22		ns
						125		16		
						150		17		
Recovered charge	Q_r	$di/dt = 5202 A/\mu s$ $di/dt = 7639 A/\mu s$ $di/dt = 7755 A/\mu s$	-2 / 18	600	100	25		0,759		μC
						125		0,729		
						150		0,713		
Reverse recovered energy	E_{rec}	$di/dt = 5202 A/\mu s$ $di/dt = 7639 A/\mu s$ $di/dt = 7755 A/\mu s$	-2 / 18	600	100	25		0,156		mWs
						125		0,165		
						150		0,177		
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$	$di/dt = 5202 A/\mu s$ $di/dt = 7639 A/\mu s$ $di/dt = 7755 A/\mu s$	-2 / 18	600	100	25		2264		A/ μs
						125		9943		
						150		9635		



Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V]	I_C [A] I_D [A]	I_F [A]	T_j [°C]	Min	Typ	Max	

AC Reactive Open configuration

Switch Dynamic

Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V]	I_C [A] I_D [A]	I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Turn-on delay time	$t_{d(on)}$	$R_{gon} = 2 \Omega$ $R_{goff} = 2 \Omega$	-2 / 18	600	100			25	51		ns
								125	55		
								150	54		
Rise time	t_r							25	18		
								125	20		
								150	21		
Turn-off delay time	$t_{d(off)}$							25	132		
								125	143		
								150	146		
Fall time	t_f							25	18		
								125	23		
								150	23		
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 1,2 \mu C$ $Q_{tFWD} = 1,2 \mu C$ $Q_{tFWD} = 1,2 \mu C$						25	1,92		
								125	1,91		
								150	2,07		
Turn-off energy (per pulse)	E_{off}							25	1,65		
								125	1,75		
								150	1,74		

Diode Dynamic

Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V]	I_C [A] I_D [A]	I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Peak recovery current	I_{RRM}							25	45		
								125	43		
								150	45		
Reverse recovery time	t_{rr}							25	32		
								125	37		
								150	37		
Recovered charge	Q_r	$di/dt = 6506 A/\mu s$ $di/dt = 4757 A/\mu s$ $di/dt = 4833 A/\mu s$						25	1,22		
								125	1,21		
								150	1,20		
Reverse recovered energy	E_{rec}							25	0,455		
								125	0,598		
								150	0,592		
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$							25	4067		
								125	2444		
								150	2741		



Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max		

AC Real Short configuration

Switch Dynamic

Parameter	Symbol	Conditions	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Turn-on delay time	$t_{d(on)}$	$R_{g(on)} = 2 \Omega$ $R_{g(off)} = 2 \Omega$	-2 / 18	600	100	25		54		ns
						125		53		
						150		53		
Rise time	t_r	$R_{g(on)} = 2 \Omega$ $R_{g(off)} = 2 \Omega$	-2 / 18	600	100	25		20		ns
						125		22		
						150		22		
Turn-off delay time	$t_{d(off)}$	$R_{g(on)} = 2 \Omega$ $R_{g(off)} = 2 \Omega$	-2 / 18	600	100	25		134		ns
						125		146		
						150		147		
Fall time	t_f	$R_{g(on)} = 2 \Omega$ $R_{g(off)} = 2 \Omega$	-2 / 18	600	100	25		22		ns
						125		24		
						150		25		
Turn-on energy (per pulse)	E_{on}	$Q_{rFWD} = 1,2 \mu C$ $Q_{rFWD} = 1,2 \mu C$ $Q_{rFWD} = 1,1 \mu C$	-2 / 18	600	100	25		1,89		mWs
						125		1,64		
						150		1,62		
Turn-off energy (per pulse)	E_{off}	$Q_{rFWD} = 1,2 \mu C$ $Q_{rFWD} = 1,2 \mu C$ $Q_{rFWD} = 1,1 \mu C$	-2 / 18	600	100	25		1,13		mWs
						125		1,38		
						150		1,45		

Diode Dynamic

Parameter	Symbol	Conditions	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Peak recovery current	I_{RRM}	$di/dt = 4768 A/\mu s$ $di/dt = 4373 A/\mu s$ $di/dt = 4246 A/\mu s$	-2 / 18	600	100	25		53		A
						125		48		
						150		49		
Reverse recovery time	t_{rr}	$di/dt = 4768 A/\mu s$ $di/dt = 4373 A/\mu s$ $di/dt = 4246 A/\mu s$	-2 / 18	600	100	25		33		ns
						125		34		
						150		34		
Recovered charge	Q_r	$di/dt = 4768 A/\mu s$ $di/dt = 4373 A/\mu s$ $di/dt = 4246 A/\mu s$	-2 / 18	600	100	25		1,15		μC
						125		1,19		
						150		1,12		
Reverse recovered energy	E_{rec}	$di/dt = 4768 A/\mu s$ $di/dt = 4373 A/\mu s$ $di/dt = 4246 A/\mu s$	-2 / 18	600	100	25		0,563		mWs
						125		0,671		
						150		0,636		
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$	$di/dt = 4768 A/\mu s$ $di/dt = 4373 A/\mu s$ $di/dt = 4246 A/\mu s$	-2 / 18	600	100	25		4288		A/ μs
						125		3726		
						150		3800		



Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max		

AC Reactive Short configuration

Switch Dynamic

Parameter	Symbol	Conditions	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Turn-on delay time	$t_{d(on)}$	$R_{gon} = 2 \Omega$ $R_{goff} = 2 \Omega$	-2 / 18	600	100	25		57		ns
						125		55		
						150		53		
Rise time	t_r					25		25		
						125		25		
						150		25		
Turn-off delay time	$t_{d(off)}$			25		132				
				125		144				
				150		145				
Fall time	t_f			25		24				
				125		25				
				150		26				
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 1,8 \mu C$ $Q_{tFWD} = 1,6 \mu C$ $Q_{tFWD} = 1,8 \mu C$				25		1,69		mWs
						125		1,64		
						150		1,69		
Turn-off energy (per pulse)	E_{off}					25		1,41		mWs
						125		1,55		
						150		1,57		

Diode Dynamic

Parameter	Symbol	Conditions	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Peak recovery current	I_{RRM}	$di/dt = 4238 A/\mu s$ $di/dt = 4105 A/\mu s$ $di/dt = 4164 A/\mu s$	-2 / 18	600	100	25		65		A
						125		61		
						150		63		
Reverse recovery time	t_{rr}					25		45		
						125		44		
						150		45		
Recovered charge	Q_r			25		1,84			μC	
				125		1,63				
				150		1,77				
Reverse recovered energy	E_{rec}			25		1,021			mWs	
				125		0,891				
				150		0,964				
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$			25		3747			A/ μs	
				125		3368				
				150		3440				



Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	

Neutral Point Switch

Static

Parameter	Symbol	$V_{GE} = V_{CE}$	V_{GS} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Gate-emitter threshold voltage	$V_{GE(th)}$				0,015	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		150	25 125 150		1,57 1,80 1,86	1,85	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			100	μA
Gate-emitter leakage current	I_{GES}		20	0		25			500	nA
Internal gate resistance	r_g							3		Ω
Input capacitance	C_{ies}							30000		pF
Output capacitance	C_{oes}		0	10		25		880		
Reverse transfer capacitance	C_{res}							320		
Gate charge	Q_g		15	600	150	25		1000		nC

Thermal

Parameter	Symbol	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4 \text{ W/mK}$ (PSX)	K/W

Dynamic

Parameter	Symbol	$R_{gon} = 2 \Omega$ $R_{goff} = 2 \Omega$	V_{GS} [V]	V_{CE} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	Unit
Turn-on delay time	$t_{d(on)}$	± 15	600	100	100	25		335		ns
Rise time	t_r						125	349		
							150	351		
							25	38		
Turn-off delay time	$t_{d(off)}$						125	47		
							150	49		
							25	304		
Fall time	t_f						125	351		
							150	363		
		25	101							
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 10,4 \mu\text{C}$ $Q_{tFWD} = 15 \mu\text{C}$ $Q_{tFWD} = 16,2 \mu\text{C}$	100	100	100	25		8,92		mWs
							125	11,15		
							150	11,85		
Turn-off energy (per pulse)	E_{off}						25	7,89		
							125	10,42		
							150	10,95		



Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max		

Neutral Point Diode

Static

Parameter	Symbol	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Forward voltage	V_F			150	25 125 150		1,80 1,90 1,90	2,1	V
Reverse leakage current	I_R		1200		25			40	μA

Thermal

Parameter	Symbol	λ_{paste} = 3,4 W/mK (PSX)	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$							0,63		K/W

Dynamic

Parameter	Symbol	λ_{paste} = 3,4 W/mK (PSX)	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Peak recovery current	I_{RRM}	± 15	600	100	25 125 150	25 125 150		83 86 88		A
Reverse recovery time	t_{rr}						25 125 150	310 419 453	ns	
Recovered charge	Q_r						25 125 150	10,40 15,02 16,24	μC	
Reverse recovered energy	E_{rec}						25 125 150	3,99 5,95 6,43	mWs	
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$						25 125 150	507 513 504	A/μs	

Neutral Point Switch Prot. Diode

Static

Parameter	Symbol	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Forward voltage	V_F			15	25 125		2,37 2,47	2,71	V
Reverse leakage current	I_R		1200		25 150			60 1800	μA

Thermal

Parameter	Symbol	λ_{paste} = 3,4 W/mK (PSX)	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$							1,48		K/W



Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	

DC-Link Switch

Static

Parameter	Symbol	$V_{GE} = V_{CE}$	V_{GS} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Gate-emitter threshold voltage	$V_{GE(th)}$				0,015	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		150	25 125 150		1,57 1,80 1,86	1,85	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			100	μA
Gate-emitter leakage current	I_{GES}		20	0		25			500	nA
Internal gate resistance	r_g							3		Ω
Input capacitance	C_{ies}							30000		pF
Output capacitance	C_{oes}		0	10		25		880		
Reverse transfer capacitance	C_{res}							320		
Gate charge	Q_g		15	600	150	25		1000		nC

Thermal

Parameter	Symbol	Conditions	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)	0,41	K/W

Dynamic

Parameter	Symbol	Conditions	V_{GS} [V]	V_{CE} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	Unit
Turn-on delay time	$t_{d(on)}$	$R_{gon} = 2 \Omega$ $R_{goff} = 2 \Omega$				25 125 150		317 335 350		ns
Rise time	t_r					25 125 150		36 41 45		
Turn-off delay time	$t_{d(off)}$					25 125 150		306 351 368		
Fall time	t_f					25 125 150		97 136 146		
Turn-on energy (per pulse)	E_{on}	$Q_{i-FWD} = 12,8 \mu C$ $Q_{i-FWD} = 20,8 \mu C$ $Q_{i-FWD} = 22,3 \mu C$				25 125 150		9,56 13,18 13,42		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		7,12 9,90 11,12		



Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max		

DC-Link Diode

Static

Parameter	Symbol	V_{GS} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	Unit
Forward voltage	V_F			100	25 125 150		1,82 1,96 1,97	2,1	V
Reverse leakage current	I_R		1200		25			40	µA

Thermal

Parameter	Symbol	Conditions	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)	0,78	K/W

Dynamic

Parameter	Symbol	V_{GS} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	Unit
Peak recovery current	I_{RRM}				25 125 150		117 120 118		A
Reverse recovery time	t_{rr}				25 125 150		268 406 454		ns
Recovered charge	Q_r			±15	600	100	12,79 20,79 22,27		µC
Reverse recovered energy	E_{rec}				25 125 150		4,36 7,63 8,66		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$				25 125 150		865 626 632		A/µs

DC-Link Switch Prot. Diode

Static

Parameter	Symbol	V_{GS} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	Unit
Forward voltage	V_F			100	25 125 150		1,82 1,96 1,97	2,1	V
Reverse leakage current	I_R		1200		25			40	µA

Thermal

Parameter	Symbol	Conditions	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)	0,78	K/W

Capacitor (GS)

Parameter	Symbol	Conditions	Value	Unit
Capacitance	C		10	nF
Tolerance			-10	+10
Dissipation factor		$f = 1$ kHz		0,1



Vincotech

10-PG12NAB008MR02-LC59F36T
10-PG12NAC008MR02-LC69F36T
 datasheet

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	I_C [A]	T_j [°C]	Min	Typ		Max

Thermistor

Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	$R_{100} = 1484 \Omega$				100	-5		5	%
Power dissipation	P					25		5		mW
Power dissipation constant						25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 1 \%$				25		3962		K
B-value	$B_{(25/100)}$	Tol. $\pm 1 \%$				25		4000		K
Vincotech NTC Reference									I	

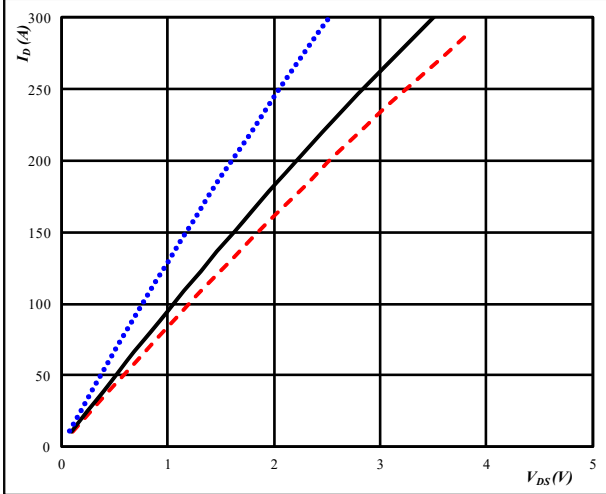


AC Switch Characteristics

figure 1. MOSFET

Typical output characteristics

$I_D = f(V_{DS})$

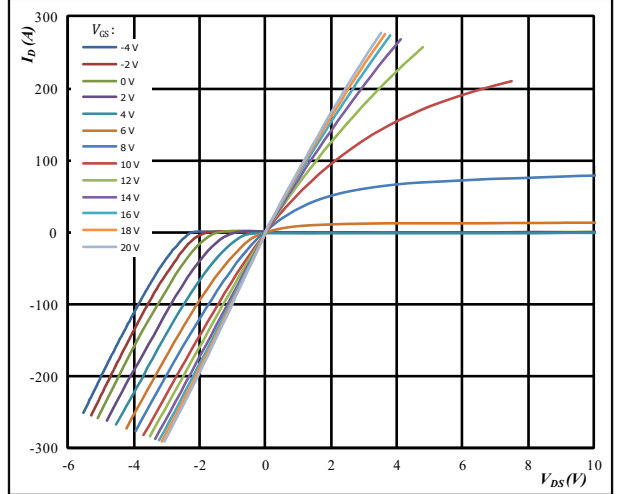


$t_p = 250 \mu s$ $T_j: 25 \text{ }^\circ C$ (blue dotted line)
 $V_{GS} = 18 \text{ V}$ $T_j: 125 \text{ }^\circ C$ (black solid line)
 $T_j: 150 \text{ }^\circ C$ (red dashed line)

figure 2. MOSFET

Typical output characteristics

$I_D = f(V_{DS})$

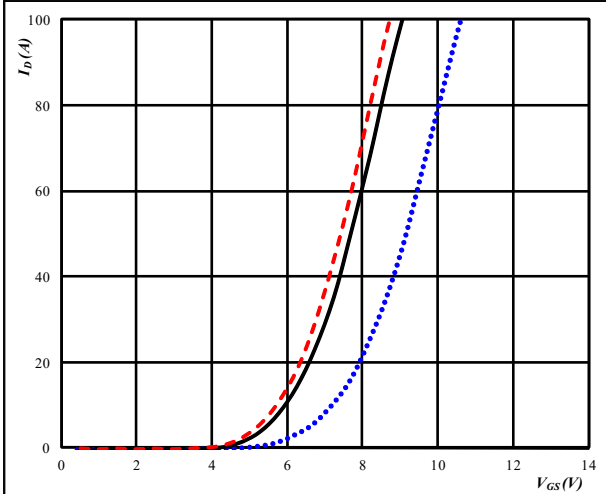


$t_p = 250 \mu s$
 $T_j = 150 \text{ }^\circ C$
 V_{GS} from -4 V to 20 V in steps of 2 V

figure 3. MOSFET

Typical transfer characteristics

$I_D = f(V_{GS})$

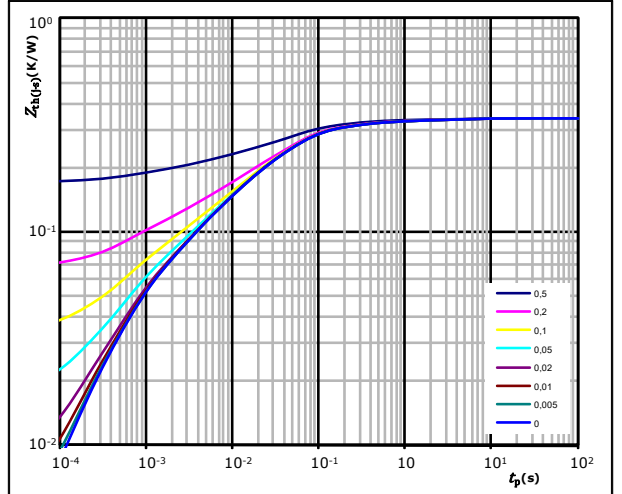


$t_p = 100 \mu s$ $T_j: 25 \text{ }^\circ C$ (blue dotted line)
 $V_{DS} = 10 \text{ V}$ $T_j: 125 \text{ }^\circ C$ (black solid line)
 $T_j: 150 \text{ }^\circ C$ (red dashed line)

figure 4. MOSFET

Transient thermal impedance as a function of pulse width

$Z_{th(j-s)} = f(t_p)$



$D = t_p / T$
 $R_{th(j-s)} = 0,34 \text{ K/W}$

MOSFET thermal model values

R (K/W)	τ (s)
1,23E-02	6,43E-01
3,10E-02	5,47E-02
1,44E-01	8,67E-03
6,59E-02	2,42E-03
4,97E-02	5,74E-04
3,74E-02	1,01E-04



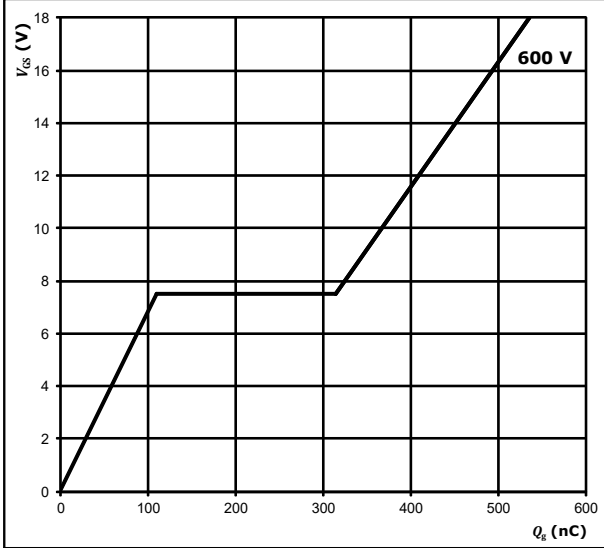
Vincotech

AC Switch Characteristics

figure 5. MOSFET

Gate voltage vs Gate charge

$$V_{GS} = f(Q_g)$$



At

$I_C = 100$ A



AC Diode Characteristics

figure 1. FWD

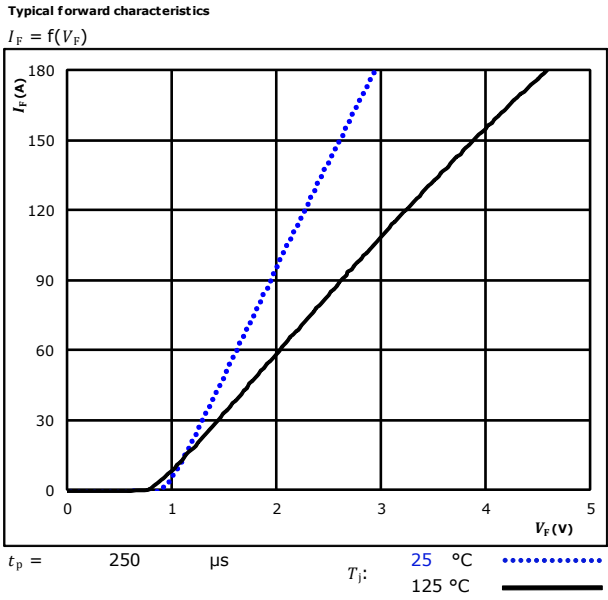
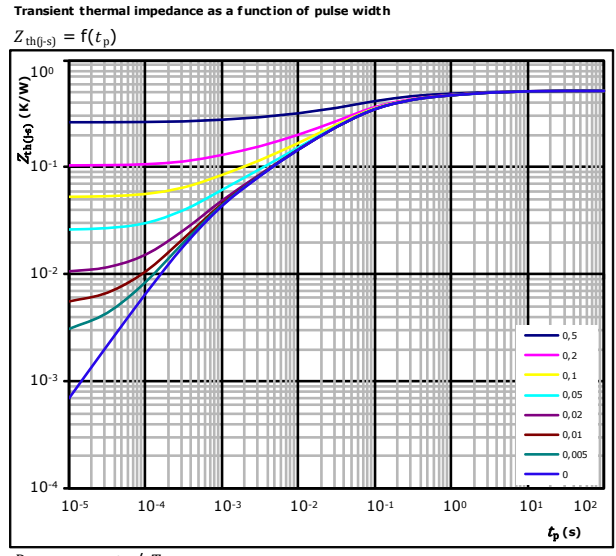


figure 2. FWD



$D = t_p / T$
 $R_{th(j-s)} = 0,52 \text{ K/W}$

FWD thermal model values

R (K/W)	τ (s)
2,95E-02	5,14E+00
6,00E-02	9,51E-01
1,02E-01	1,73E-01
1,92E-01	4,96E-02
7,17E-02	1,06E-02
3,94E-02	2,65E-03
2,53E-02	5,48E-04

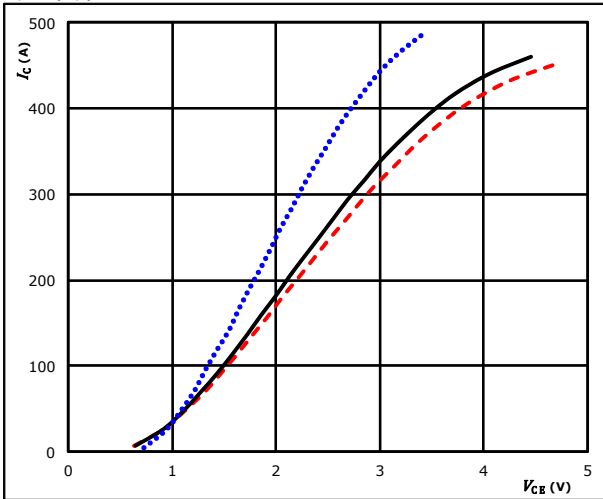


Neutral Point Switch Characteristics

figure 1. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

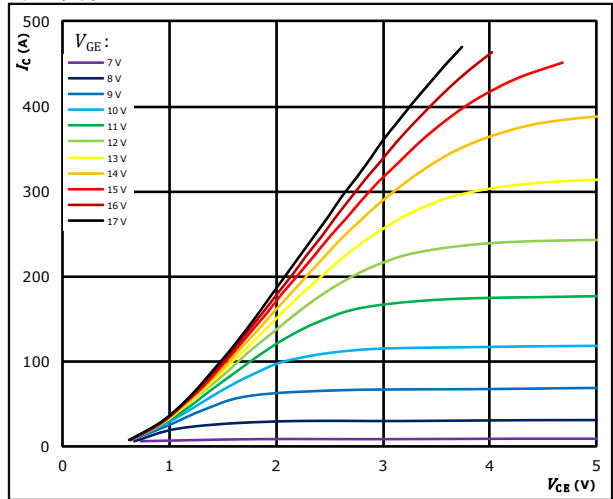


$t_p = 250 \mu s$ $T_j: 25 \text{ }^\circ C$
 $V_{GE} = 15 \text{ V}$ $T_j: 125 \text{ }^\circ C$ ———
 $T_j: 150 \text{ }^\circ C$ - - - - -

figure 2. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

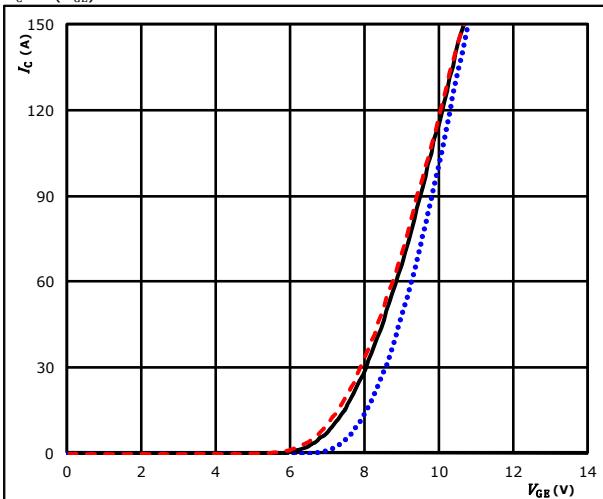


$t_p = 250 \mu s$
 $T_j = 150 \text{ }^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$

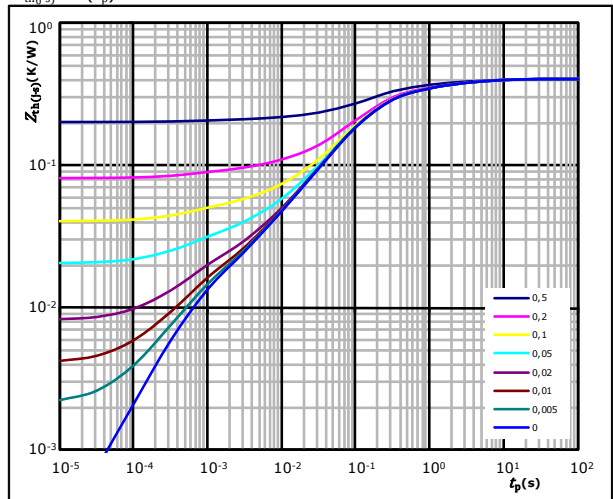


$t_p = 100 \mu s$ $T_j: 25 \text{ }^\circ C$
 $V_{CE} = 10 \text{ V}$ $T_j: 125 \text{ }^\circ C$ ———
 $T_j: 150 \text{ }^\circ C$ - - - - -

figure 4. IGBT

Transient thermal impedance as function of pulse duration

$Z_{th(j-s)} = f(t_p)$



$D = t_p / T$
 $R_{th(j-s)} = 0,41 \text{ K/W}$
 IGBT thermal model values

R (K/W)	τ (s)
3,37E-02	4,34E+00
6,56E-02	8,61E-01
1,87E-01	1,34E-01
9,56E-02	4,73E-02
1,67E-02	5,00E-03
1,10E-02	4,57E-04
9,30E-03	4,36E-04

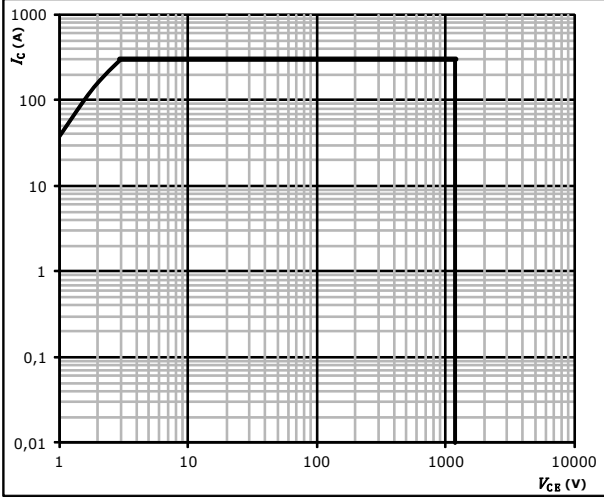


Neutral Point Switch Characteristics

figure 5. IGBT

Safe operating area

$$I_C = f(V_{CE})$$



- $D =$ single pulse
- $T_s =$ 80 °C
- $V_{GE} =$ ±15 V
- $T_j =$ T_{jmax}

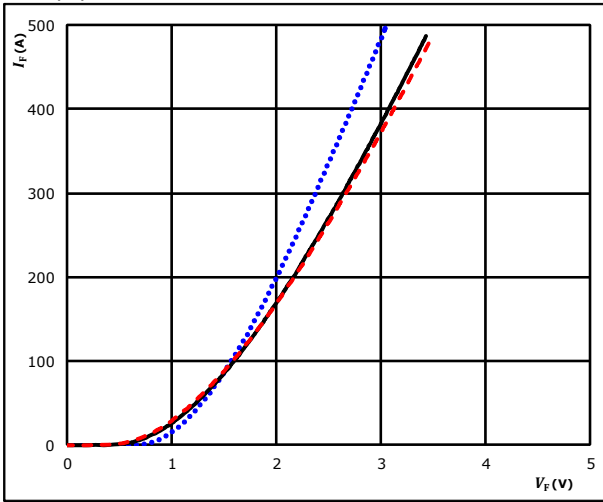


Neutral Point Diode Characteristics

figure 1. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

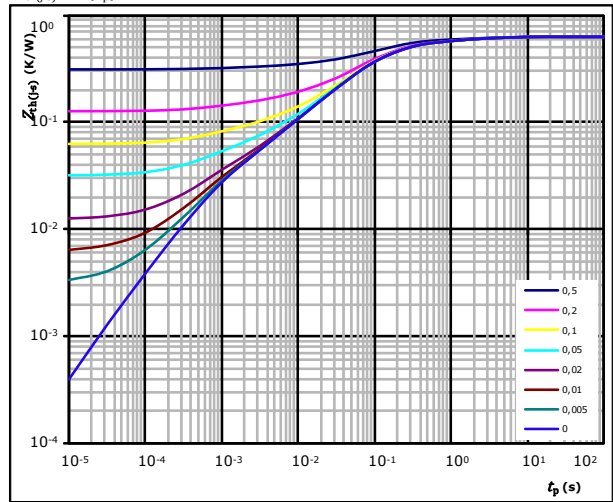


$t_p = 250 \mu s$
 T_j : 25 °C
 125 °C ———
 150 °C - - - -

figure 2. FWD

Transient thermal impedance as a function of pulse width

$$Z_{th(j-s)} = f(t_p)$$



$D = t_p / T$
 $R_{th(j-s)} = 0,63 \text{ K/W}$

FWD thermal model values

R (K/W)	τ (s)
5,76E-02	2,54E+00
9,23E-02	4,81E-01
3,12E-01	9,48E-02
1,04E-01	3,59E-02
4,08E-02	6,30E-03
2,30E-02	7,29E-04

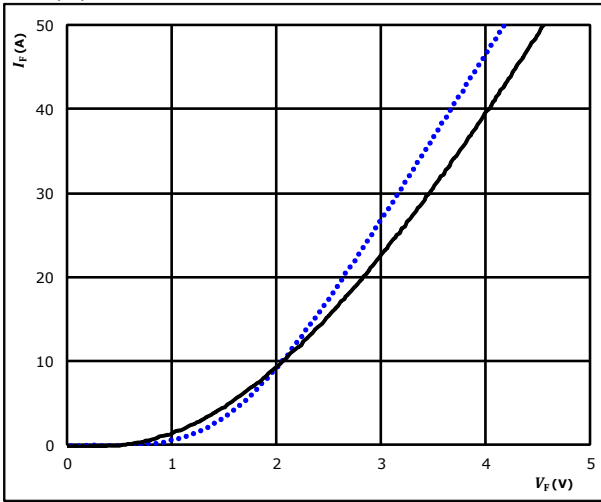


Neutral Point Switch Prot. Diode Characteristics

figure 1. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

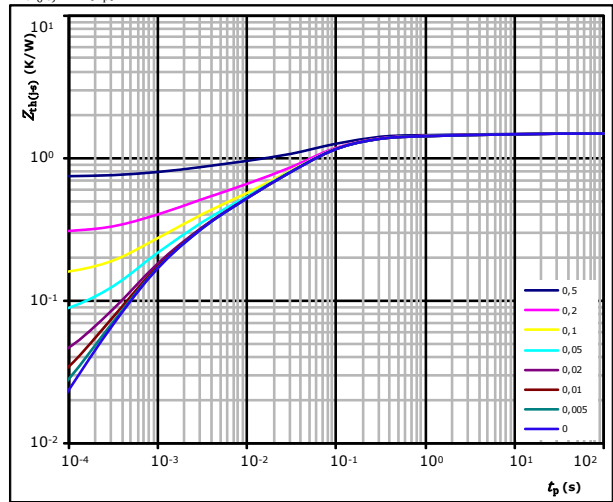


$t_p = 250 \mu s$
 $T_j: 25 \text{ }^\circ\text{C}$ (dotted blue line)
 $125 \text{ }^\circ\text{C}$ (solid black line)

figure 2. FWD

Transient thermal impedance as a function of pulse width

$$Z_{th(j-s)} = f(t_p)$$



$D = t_p / T$
 $R_{th(j-s)} = 1,48 \text{ K/W}$

FWD thermal model values

R (K/W)	τ (s)
4,85E-02	5,76E+00
1,03E-01	3,44E-01
6,61E-01	4,69E-02
3,02E-01	1,61E-02
2,12E-01	2,54E-03
1,52E-01	5,27E-04

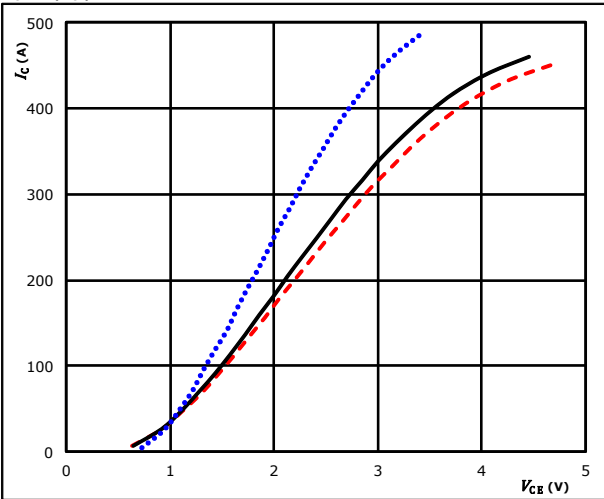


DC-Link Switch Characteristics

figure 1. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

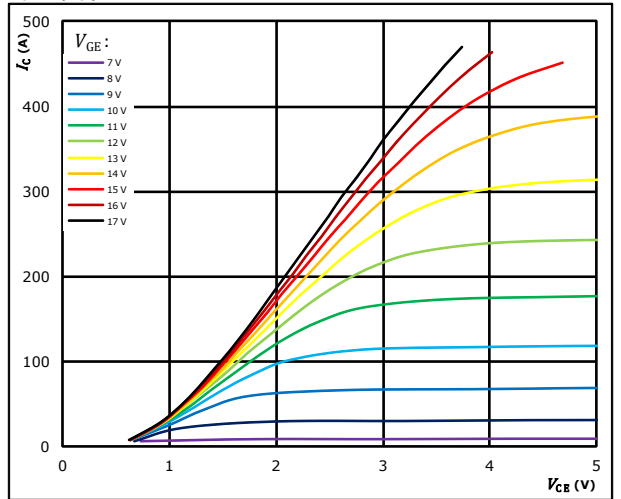


$t_p = 250 \mu s$ $T_j: 25 \text{ }^\circ C$
 $V_{GE} = 15 \text{ V}$ $T_j: 125 \text{ }^\circ C$ ———
 $T_j: 150 \text{ }^\circ C$ - - - -

figure 2. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

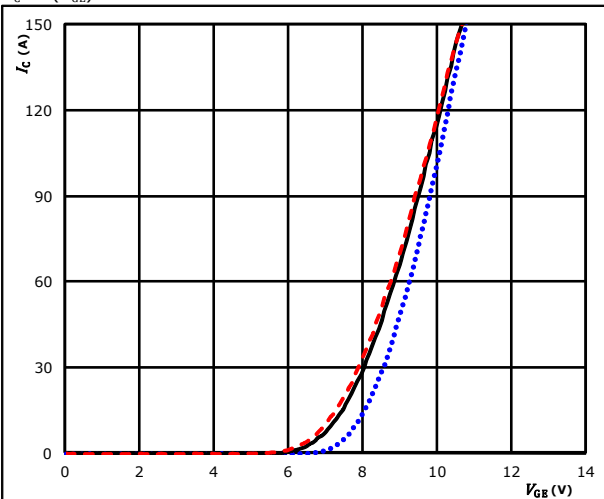


$t_p = 250 \mu s$
 $T_j = 150 \text{ }^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$

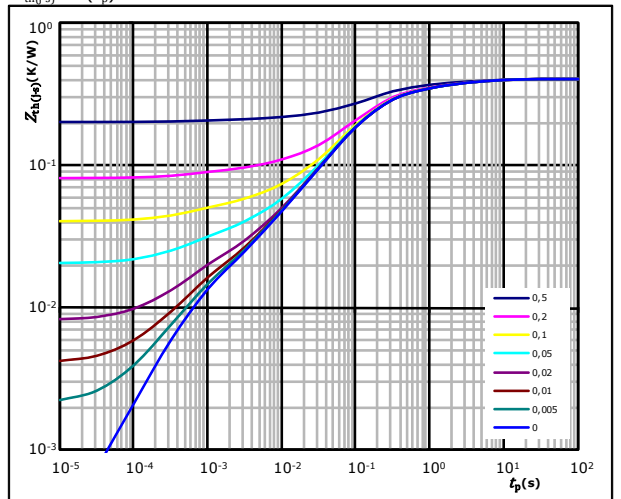


$t_p = 100 \mu s$ $T_j: 25 \text{ }^\circ C$
 $V_{CE} = 10 \text{ V}$ $T_j: 125 \text{ }^\circ C$ ———
 $T_j: 150 \text{ }^\circ C$ - - - -

figure 4. IGBT

Transient thermal impedance as function of pulse duration

$Z_{th(j-s)} = f(t_p)$



$D = t_p / T$
 $R_{th(j-s)} = 0,41 \text{ K/W}$

IGBT thermal model values

R (K/W)	τ (s)
3,37E-02	4,34E+00
6,56E-02	8,61E-01
1,87E-01	1,34E-01
9,56E-02	4,73E-02
1,67E-02	5,00E-03
1,10E-02	4,57E-04
9,30E-03	4,36E-04

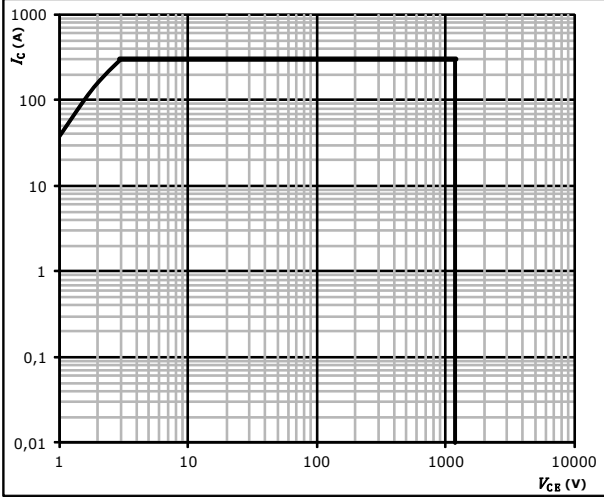


DC-Link Switch Characteristics

figure 5. IGBT

Safe operating area

$$I_C = f(V_{CE})$$



- $D =$ single pulse
- $T_s =$ 80 °C
- $V_{GE} =$ ±15 V
- $T_j =$ T_{jmax}

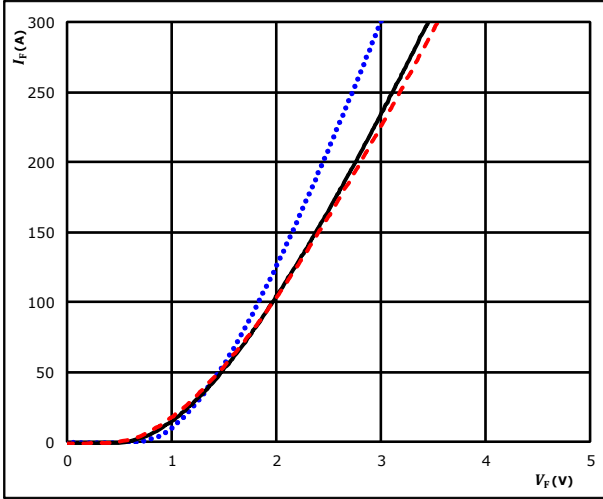


DC-Link Diode Characteristics

figure 1. FWD

Typical forward characteristics

$$I_F = f(V_F)$$



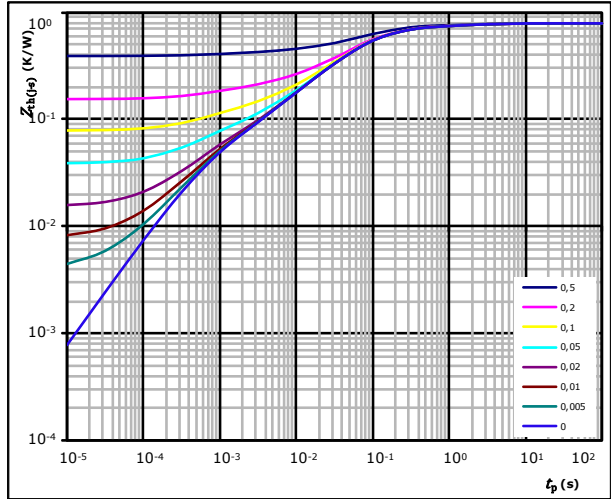
$t_p = 250 \mu\text{s}$

T_j : 25 °C (blue dotted line)
 125 °C (black solid line)
 150 °C (red dashed line)

figure 2. FWD

Transient thermal impedance as a function of pulse width

$$Z_{th(j-s)} = f(t_p)$$



$D = \frac{t_p}{T}$

$R_{th(j-s)} = 0,78 \text{ K/W}$

FWD thermal model values

R (K/W)	τ (s)
4,02E-02	3,22E+00
8,94E-02	5,33E-01
3,67E-01	8,87E-02
1,96E-01	3,01E-02
5,18E-02	4,55E-03
3,55E-02	6,21E-04

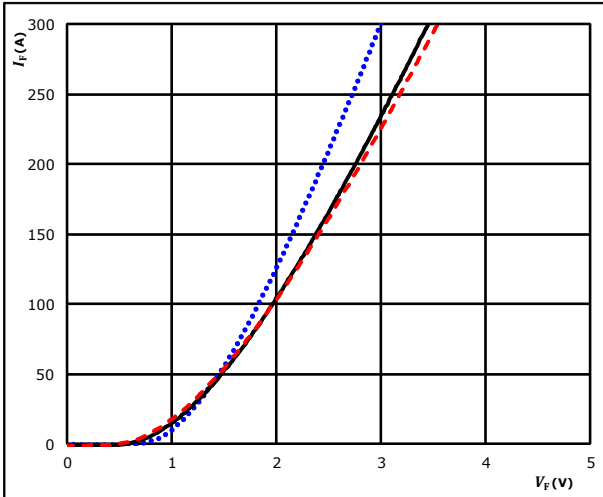


DC-Link Switch Prot. Diode Characteristics

figure 1. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

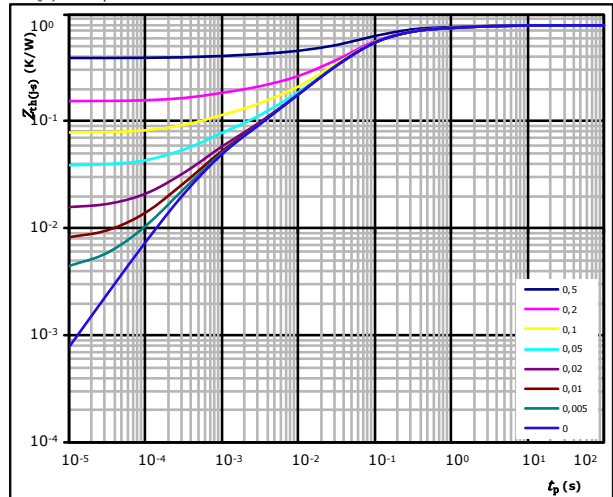


$t_p = 250 \mu s$
 T_j : 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

figure 2. FWD

Transient thermal impedance as a function of pulse width

$$Z_{th(j-s)} = f(t_p)$$



$$D = \frac{t_p}{T}$$

$$R_{th(j-s)} = 0,78 \text{ K/W}$$

FWD thermal model values

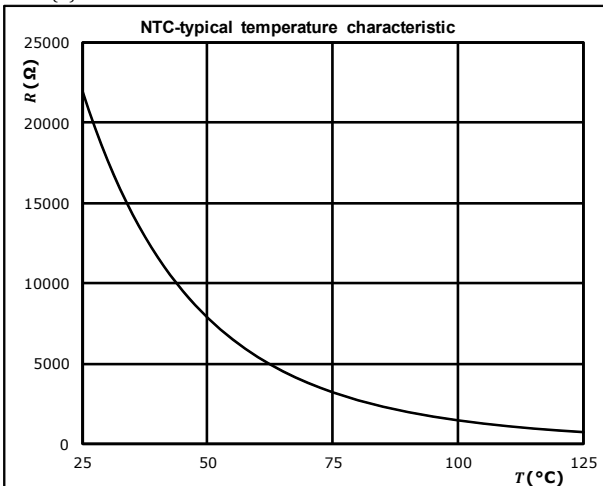
R (K/W)	τ (s)
4,02E-02	3,22E+00
8,94E-02	5,33E-01
3,67E-01	8,87E-02
1,96E-01	3,01E-02
5,18E-02	4,55E-03
3,55E-02	6,21E-04

Thermistor Characteristics

figure 1. Thermistor

Typical NTC characteristic as a function of temperature

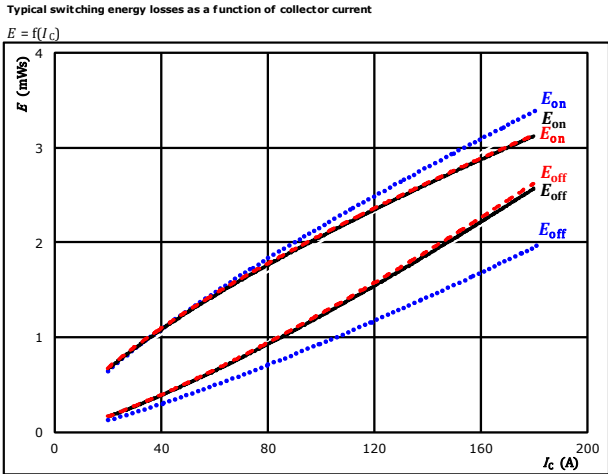
$$R = f(T)$$





AC Real Open Switching Characteristics

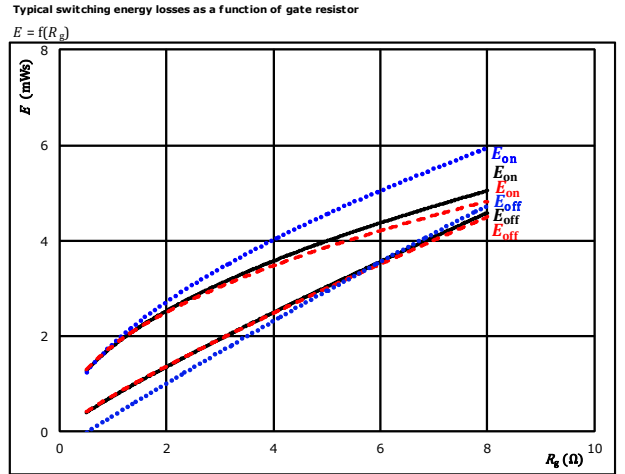
figure 1. IGBT



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = -2 / 18$ V
 $R_{gon} = 2$ Ω
 $R_{goff} = 2$ Ω

T_j : 25 °C (dotted blue line)
 125 °C (solid black line)
 150 °C (dashed red line)

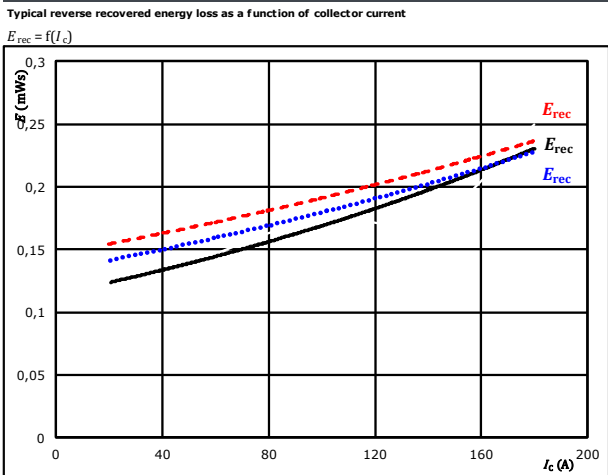
figure 2. IGBT



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = -2 / 18$ V
 $I_C = 100$ A

T_j : 25 °C (dotted blue line)
 125 °C (solid black line)
 150 °C (dashed red line)

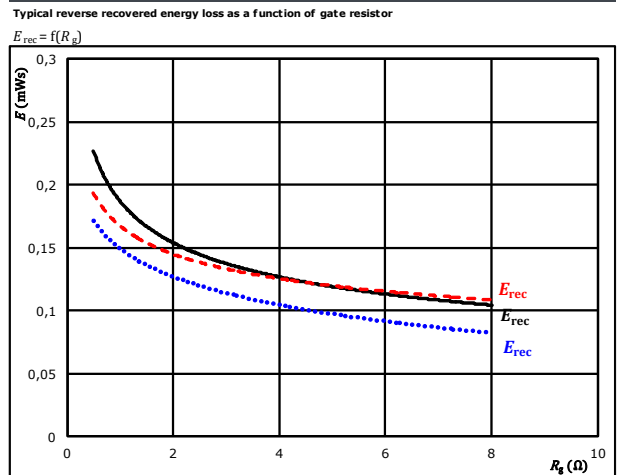
figure 3. FWD



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = -2 / 18$ V
 $R_{gon} = 2$ Ω

T_j : 25 °C (dotted blue line)
 125 °C (solid black line)
 150 °C (dashed red line)

figure 4. FWD



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = -2 / 18$ V
 $I_C = 100$ A

T_j : 25 °C (dotted blue line)
 125 °C (solid black line)
 150 °C (dashed red line)

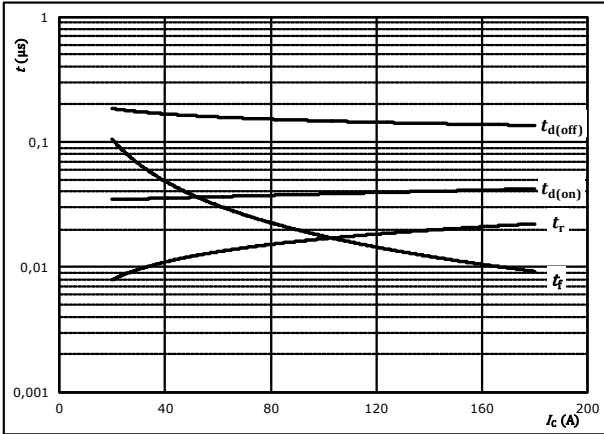


AC Real Open Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



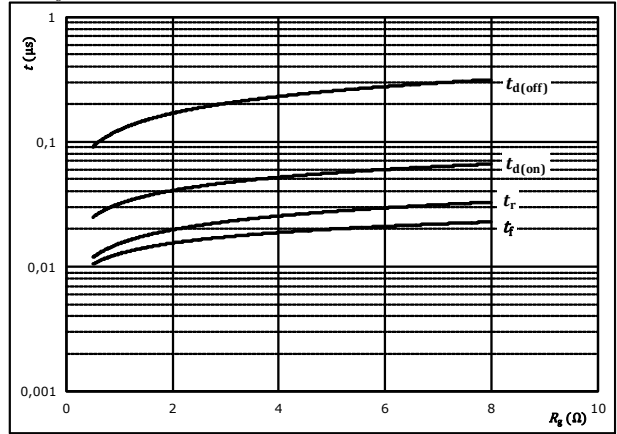
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	600	V
$V_{GE} =$	-2 / 18	V
$R_{gon} =$	2	Ω
$R_{goff} =$	2	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



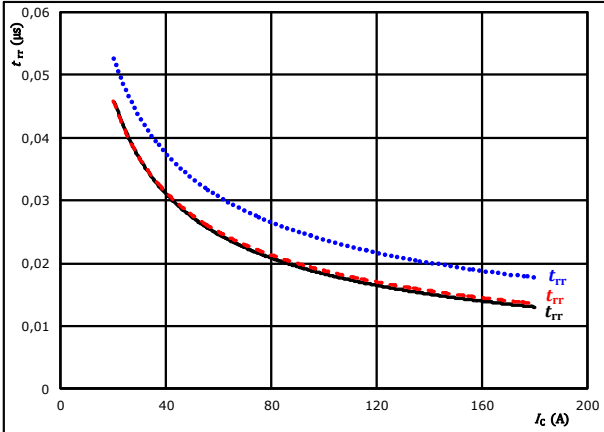
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	600	V
$V_{GE} =$	-2 / 18	V
$I_C =$	100	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$$t_{rr} = f(I_C)$$

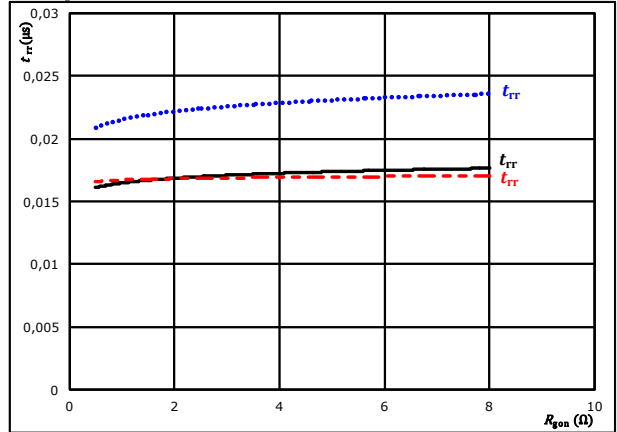


At	$V_{CE} =$	600	V	$T_j:$	25 °C	.....
	$V_{GE} =$	-2 / 18	V		125 °C	————
	$R_{gon} =$	2	Ω		150 °C	-----

figure 8. FWD

Typical reverse recovery time as a function of IGBT turn on gate resistor

$$t_{rr} = f(R_{gon})$$

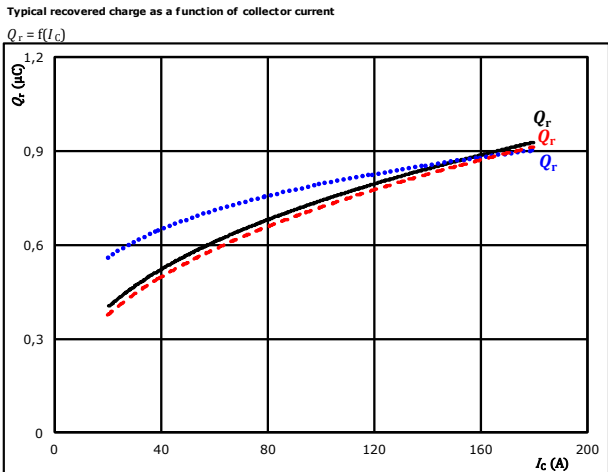


At	$V_{CE} =$	600	V	$T_j:$	25 °C	.....
	$V_{GE} =$	-2 / 18	V		125 °C	————
	$I_C =$	100	A		150 °C	-----



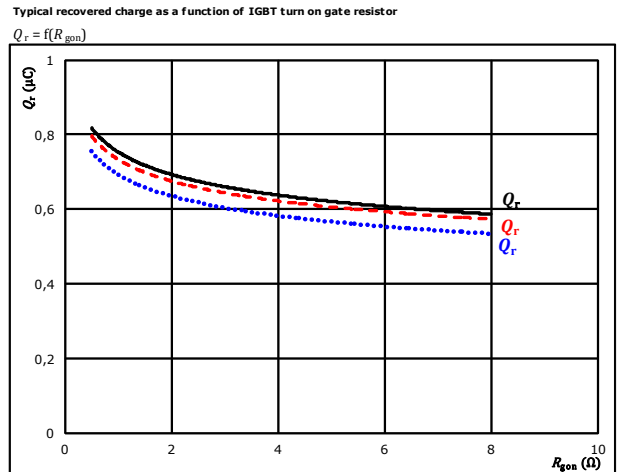
AC Real Open Switching Characteristics

figure 9. FWD



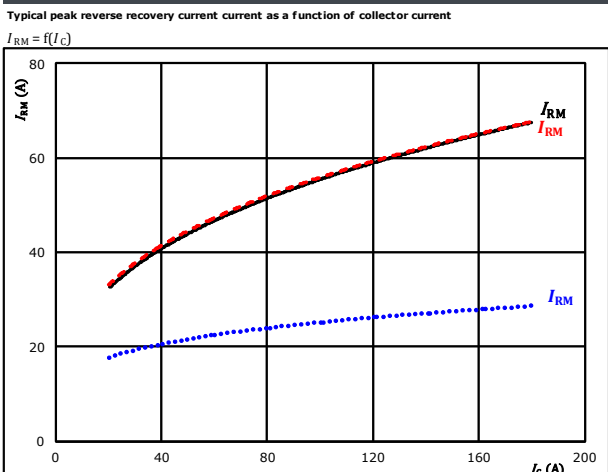
At $V_{CE} = 600$ V $T_j = 25$ °C $\dots\dots\dots$
 $V_{GE} = -2 / 18$ V $T_j = 125$ °C ---
 $R_{gon} = 2$ Ω $T_j = 150$ °C --- --

figure 10. FWD



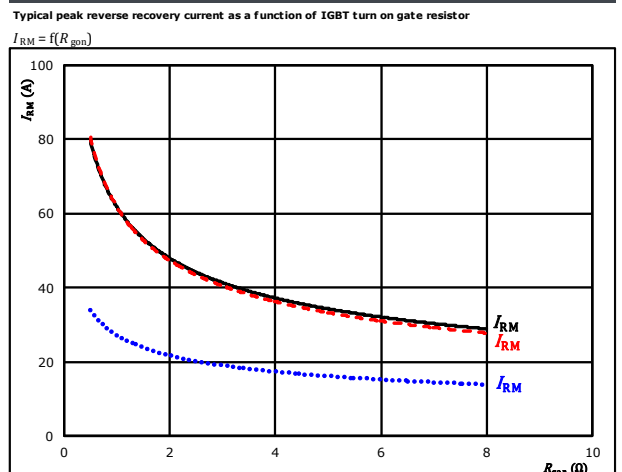
At $V_{CE} = 600$ V $T_j = 25$ °C $\dots\dots\dots$
 $V_{GE} = -2 / 18$ V $T_j = 125$ °C ---
 $I_c = 100$ A $T_j = 150$ °C --- --

figure 11. FWD



At $V_{CE} = 600$ V $T_j = 25$ °C $\dots\dots\dots$
 $V_{GE} = -2 / 18$ V $T_j = 125$ °C ---
 $R_{gon} = 2$ Ω $T_j = 150$ °C --- --

figure 12. FWD



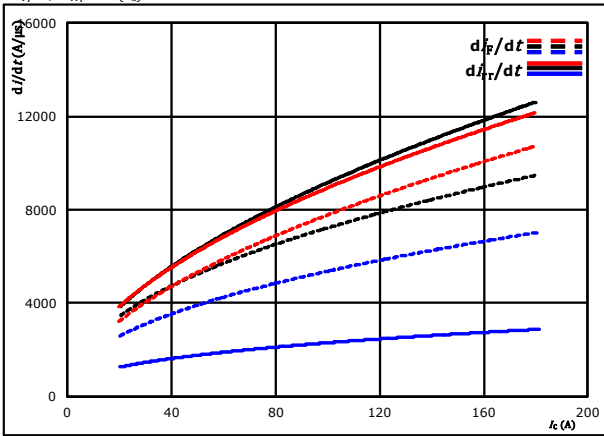
At $V_{CE} = 600$ V $T_j = 25$ °C $\dots\dots\dots$
 $V_{GE} = -2 / 18$ V $T_j = 125$ °C ---
 $I_c = 100$ A $T_j = 150$ °C --- --



AC Real Open Switching Characteristics

figure 13. FWD

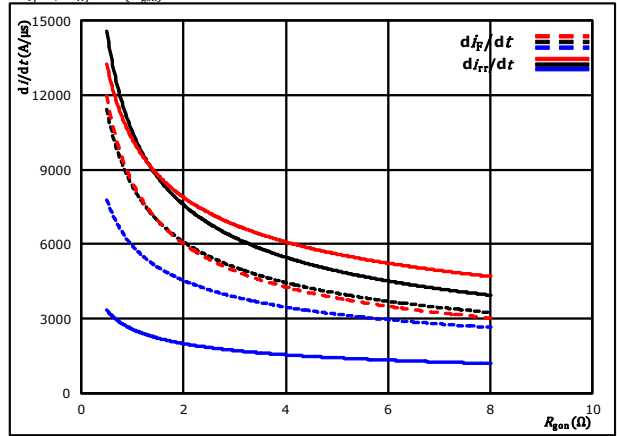
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_{f}/dt, di_{rr}/dt = f(I_c)$



At $V_{CE} = 600$ V $T_j = 25$ °C
 $V_{GE} = -2 / 18$ V $T_j = 125$ °C
 $R_{g0n} = 2$ Ω $T_j = 150$ °C

figure 14. FWD

Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
 $di_{f}/dt, di_{rr}/dt = f(R_{g0n})$

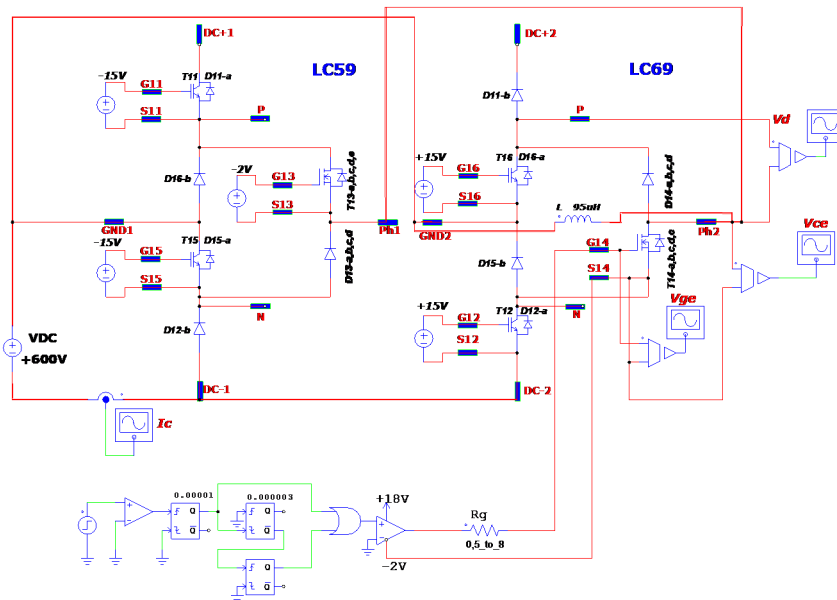


At $V_{CE} = 600$ V $T_j = 25$ °C
 $V_{GE} = -2 / 18$ V $T_j = 125$ °C
 $I_c = 100$ A $T_j = 150$ °C

AC Real Open measurement circuit

figure 1.

AC Real PN Open Configuration



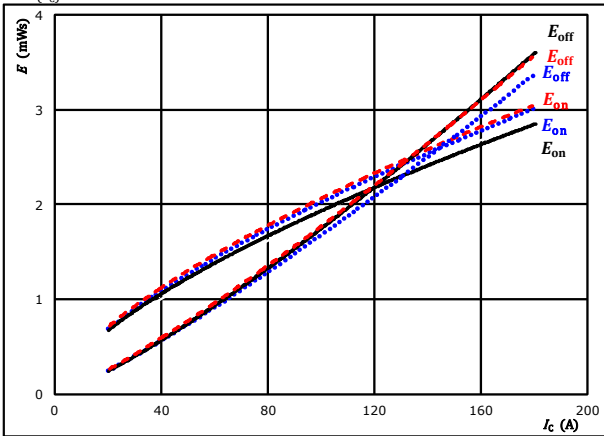


AC Reactive Open Switching Characteristics

figure 1. IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_C)$$



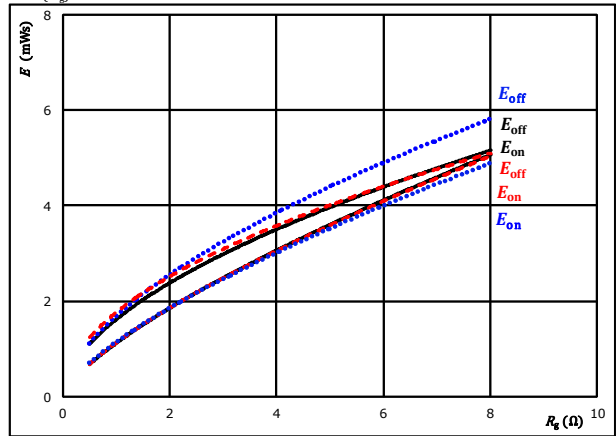
With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = -2 / 18$ V
 $R_{gon} = 2$ Ω
 $R_{goff} = 2$ Ω

T_j : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

figure 2. IGBT

Typical switching energy losses as a function of gate resistor

$$E = f(R_g)$$



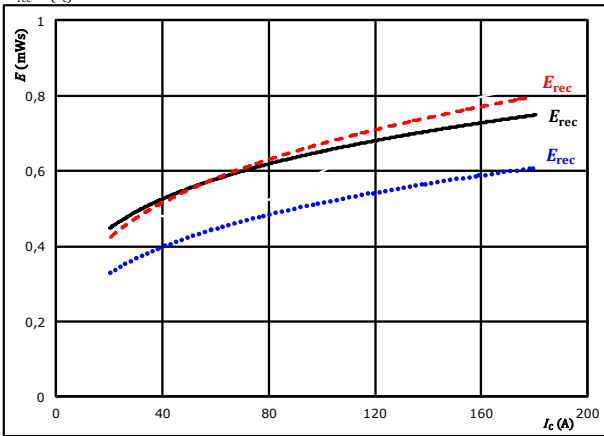
With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = -2 / 18$ V
 $I_C = 100$ A

T_j : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

figure 3. FWD

Typical reverse recovered energy loss as a function of collector current

$$E_{rec} = f(I_C)$$



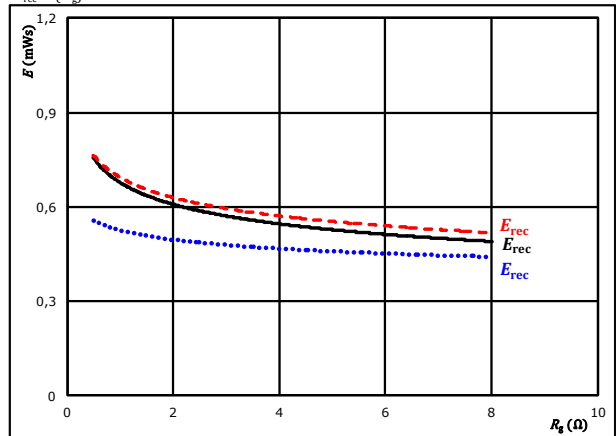
With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = -2 / 18$ V
 $R_{gon} = 2$ Ω

T_j : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

figure 4. FWD

Typical reverse recovered energy loss as a function of gate resistor

$$E_{rec} = f(R_g)$$



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = -2 / 18$ V
 $I_C = 100$ A

T_j : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)



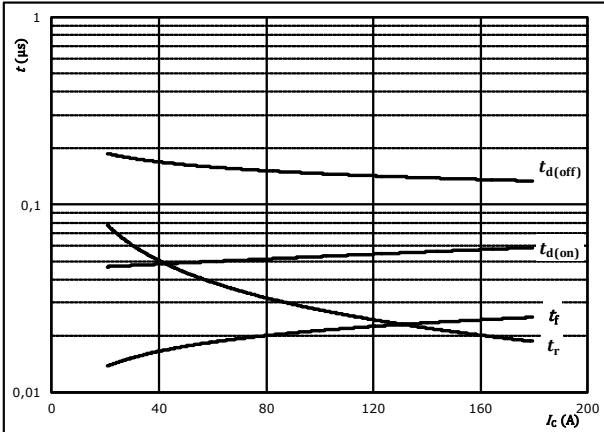
Vincotech

AC Reactive Open Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



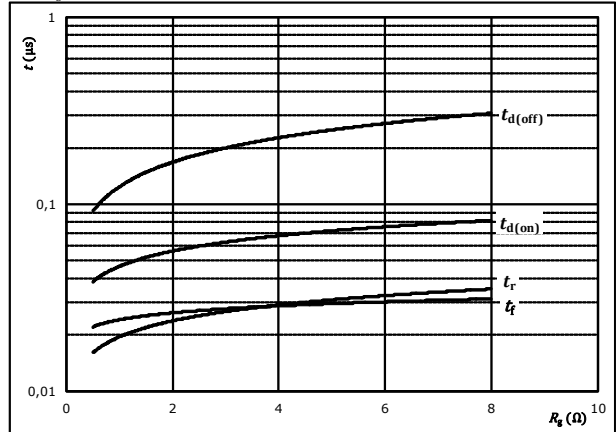
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	600	V
$V_{GE} =$	-2 / 18	V
$R_{gon} =$	2	Ω
$R_{goff} =$	2	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



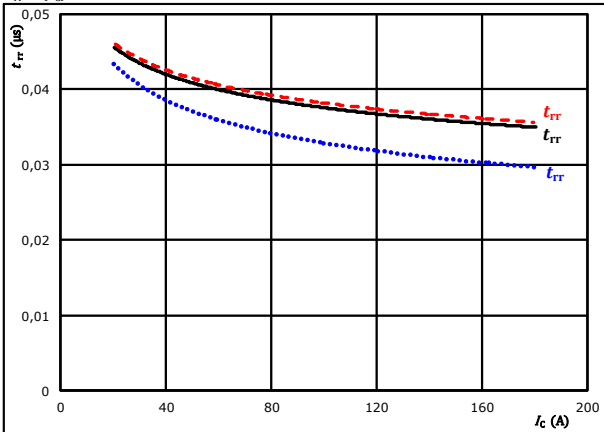
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	600	V
$V_{GE} =$	-2 / 18	V
$I_C =$	100	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$$t_{rr} = f(I_C)$$

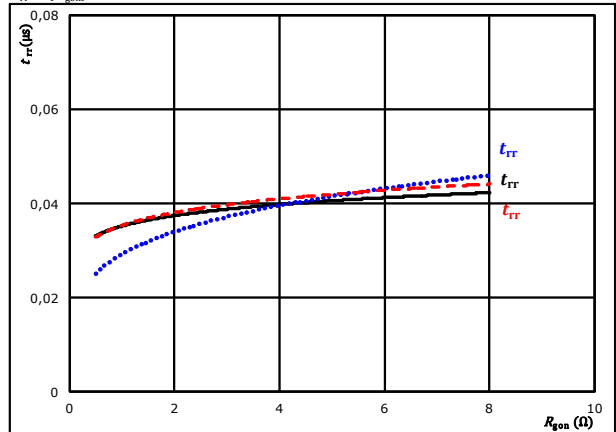


At	$V_{CE} =$	600	V	$T_j:$	25 °C	.....
	$V_{GE} =$	-2 / 18	V		125 °C	————
	$R_{gon} =$	2	Ω		150 °C	-----

figure 8. FWD

Typical reverse recovery time as a function of IGBT turn on gate resistor

$$t_{rr} = f(R_{gon})$$

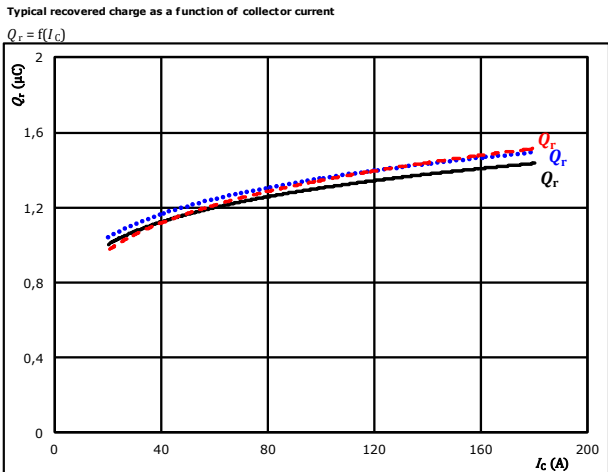


At	$V_{CE} =$	600	V	$T_j:$	25 °C	.....
	$V_{GE} =$	-2 / 18	V		125 °C	————
	$I_C =$	100	A		150 °C	-----



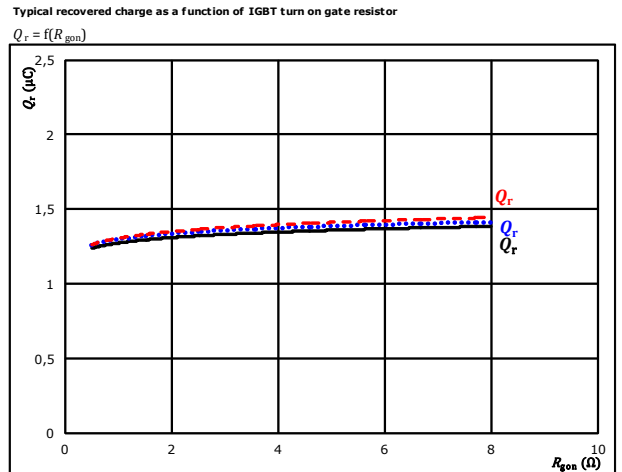
AC Reactive Open Switching Characteristics

figure 9. FWD



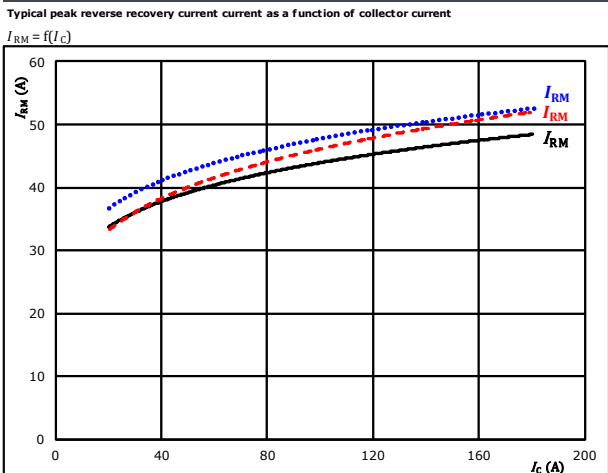
At $V_{CE} = 600$ V $T_j = 25$ °C
 $V_{GE} = -2 / 18$ V $T_j = 125$ °C ———
 $R_{gon} = 2$ Ω $T_j = 150$ °C - - - - -

figure 10. FWD



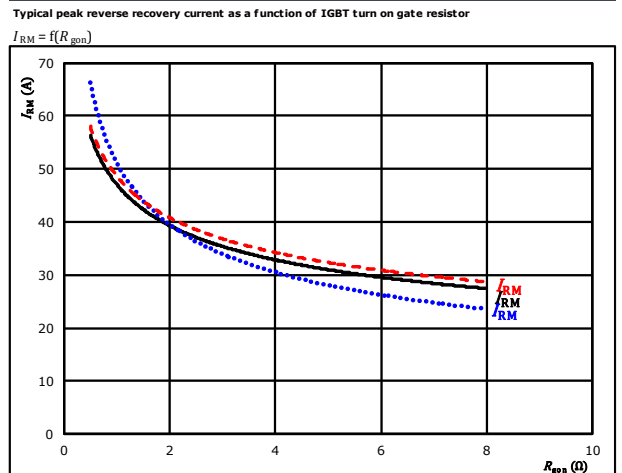
At $V_{CE} = 600$ V $T_j = 25$ °C
 $V_{GE} = -2 / 18$ V $T_j = 125$ °C ———
 $I_c = 100$ A $T_j = 150$ °C - - - - -

figure 11. FWD



At $V_{CE} = 600$ V $T_j = 25$ °C
 $V_{GE} = -2 / 18$ V $T_j = 125$ °C ———
 $R_{gon} = 2$ Ω $T_j = 150$ °C - - - - -

figure 12. FWD



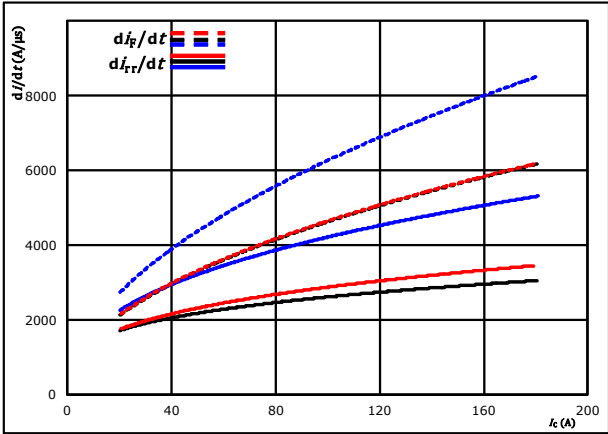
At $V_{CE} = 600$ V $T_j = 25$ °C
 $V_{GE} = -2 / 18$ V $T_j = 125$ °C ———
 $I_c = 100$ A $T_j = 150$ °C - - - - -



AC Reactive Open Switching Characteristics

figure 13. FWD

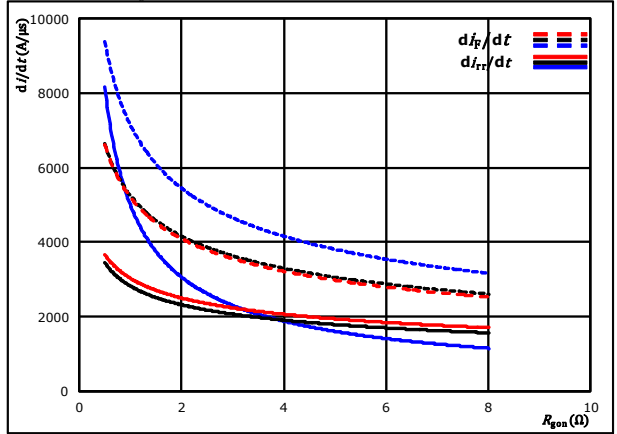
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_F/dt, di_{rr}/dt = f(I_C)$



At $V_{CE} = 600$ V $T_j = 25$ °C
 $V_{GE} = -2 / 18$ V $T_j = 125$ °C
 $R_{g0n} = 2$ Ω $T_j = 150$ °C

figure 14. FWD

Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
 $di_F/dt, di_{rr}/dt = f(R_{g0n})$

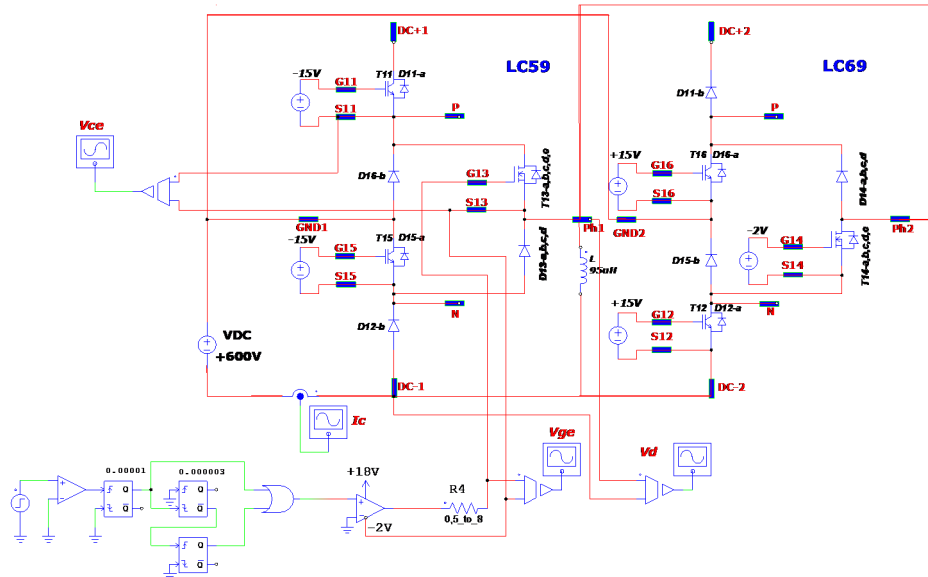


At $V_{CE} = 600$ V $T_j = 25$ °C
 $V_{GE} = -2 / 18$ V $T_j = 125$ °C
 $I_C = 100$ A $T_j = 150$ °C

AC Reactive Open measurement circuit

figure 1.

AC Reactive PN Open Configuration



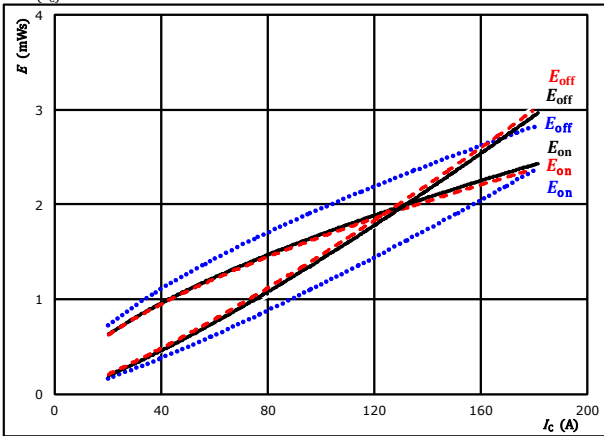


AC Real Short Switching Characteristics

figure 1. IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_C)$$



With an inductive load at

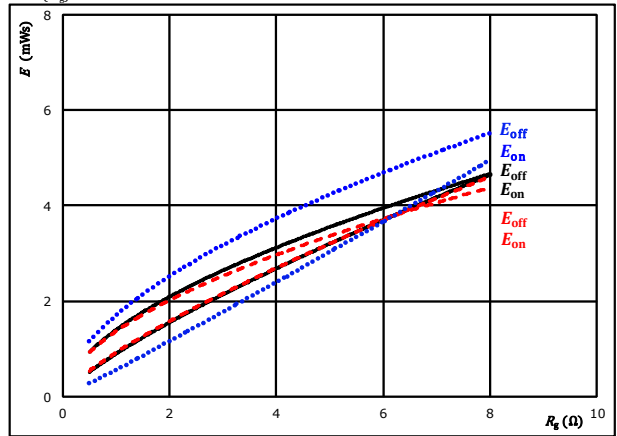
$V_{CE} = 600$ V
 $V_{GE} = -2 / 18$ V
 $R_{gon} = 2$ Ω
 $R_{goff} = 2$ Ω

T_j : 25 °C (dotted blue)
 125 °C (solid black)
 150 °C (dashed red)

figure 2. IGBT

Typical switching energy losses as a function of gate resistor

$$E = f(R_g)$$



With an inductive load at

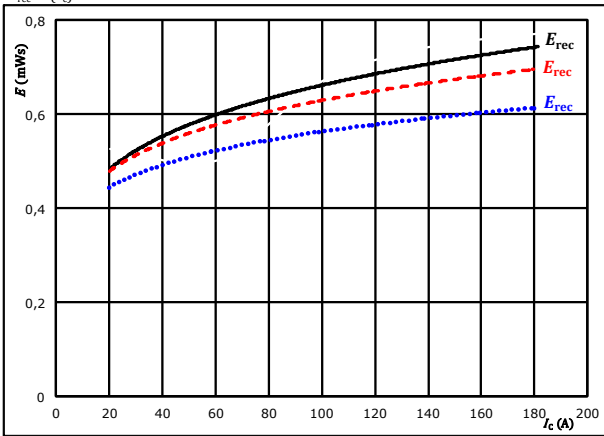
$V_{CE} = 600$ V
 $V_{GE} = -2 / 18$ V
 $I_C = 100$ A

T_j : 25 °C (dotted blue)
 125 °C (solid black)
 150 °C (dashed red)

figure 3. FWD

Typical reverse recovered energy loss as a function of collector current

$$E_{rec} = f(I_C)$$



With an inductive load at

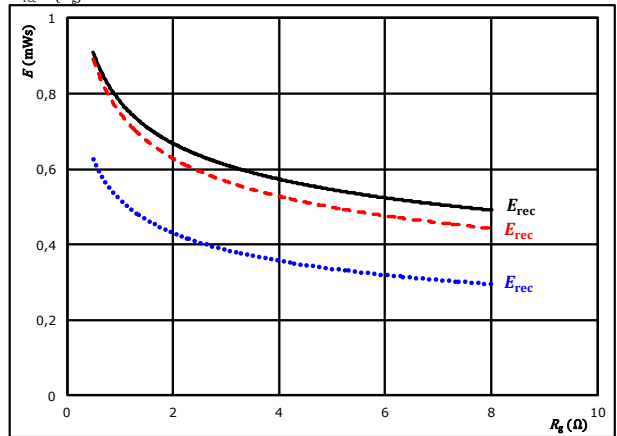
$V_{CE} = 600$ V
 $V_{GE} = -2 / 18$ V
 $R_{gon} = 2$ Ω

T_j : 25 °C (dotted blue)
 125 °C (solid black)
 150 °C (dashed red)

figure 4. FWD

Typical reverse recovered energy loss as a function of gate resistor

$$E_{rec} = f(R_g)$$



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = -2 / 18$ V
 $I_C = 100$ A

T_j : 25 °C (dotted blue)
 125 °C (solid black)
 150 °C (dashed red)

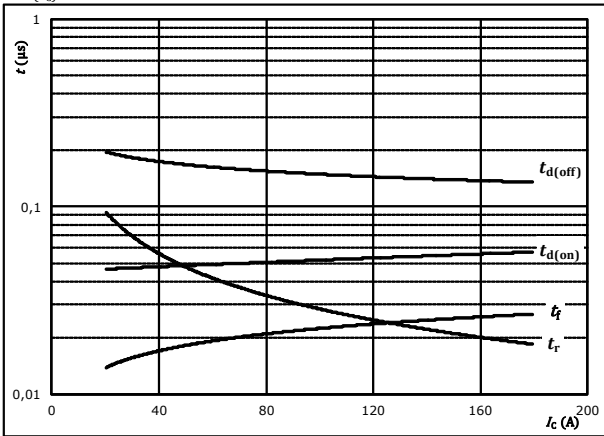


AC Real Short Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_c)$$



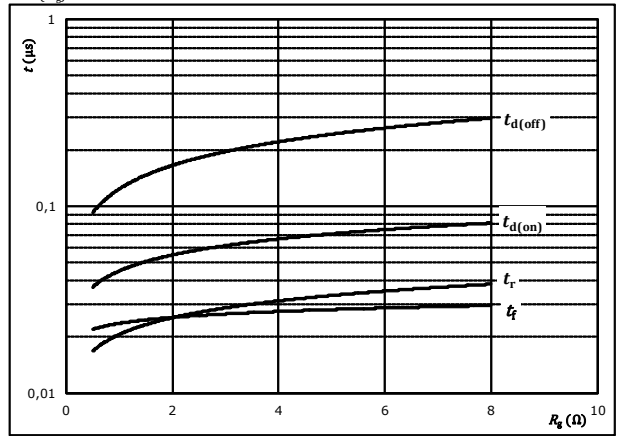
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	600	V
$V_{GE} =$	-2 / 18	V
$R_{gon} =$	2	Ω
$R_{goff} =$	2	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



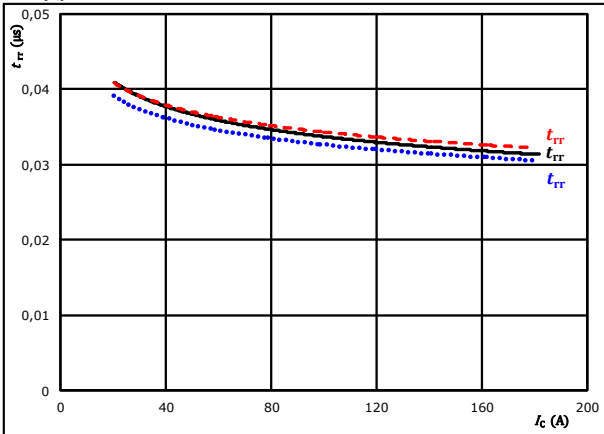
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	600	V
$V_{GE} =$	-2 / 18	V
$I_c =$	100	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$$t_{rr} = f(I_c)$$

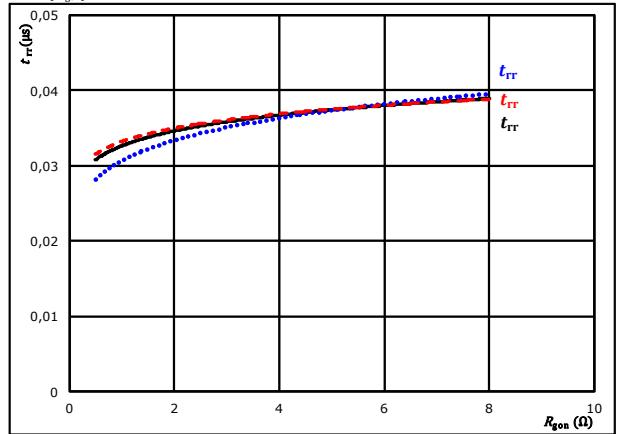


At	$V_{CE} =$	600	V	$T_j:$	25 °C	.....
	$V_{GE} =$	-2 / 18	V		125 °C	————
	$R_{gon} =$	2	Ω		150 °C	-----

figure 8. FWD

Typical reverse recovery time as a function of IGBT turn on gate resistor

$$t_{rr} = f(R_{gon})$$

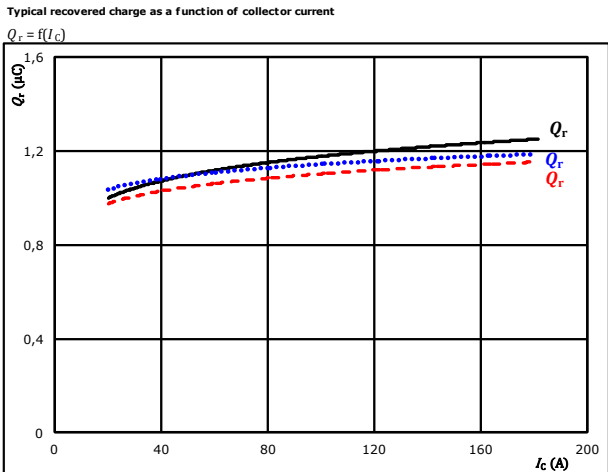


At	$V_{CE} =$	600	V	$T_j:$	25 °C	.....
	$V_{GE} =$	-2 / 18	V		125 °C	————
	$I_c =$	100	A		150 °C	-----



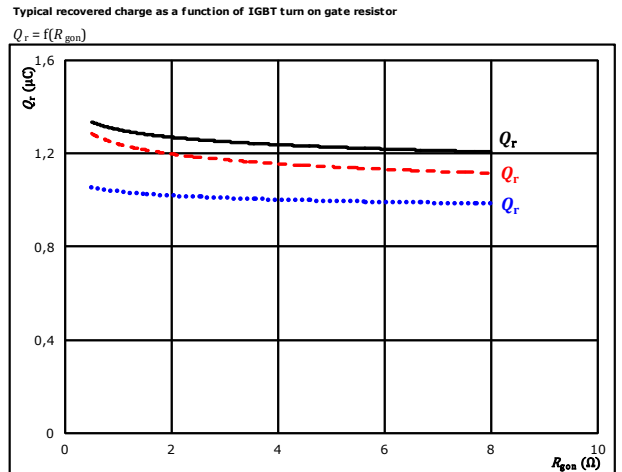
AC Real Short Switching Characteristics

figure 9. FWD



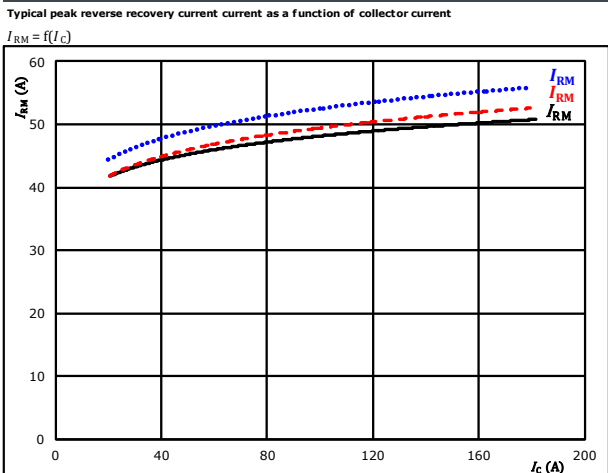
At $V_{CE} = 600$ V $T_j = 25$ °C $I_c = 100$ A
 $V_{GE} = -2 / 18$ V $T_j = 125$ °C
 $R_{gon} = 2$ Ω $T_j = 150$ °C

figure 10. FWD



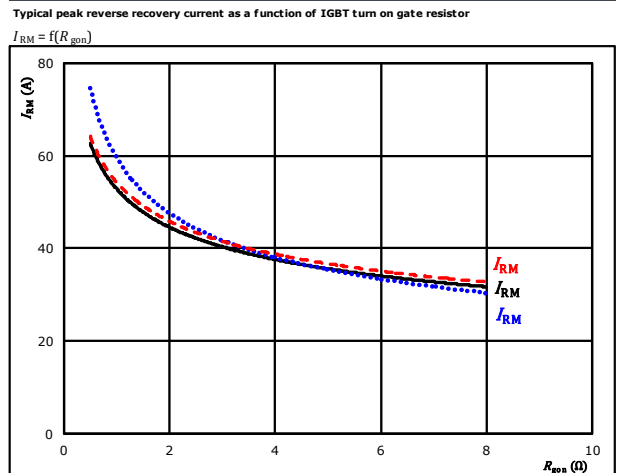
At $V_{CE} = 600$ V $T_j = 25$ °C $I_c = 100$ A
 $V_{GE} = -2 / 18$ V $T_j = 125$ °C
 $I_c = 100$ A $T_j = 150$ °C

figure 11. FWD



At $V_{CE} = 600$ V $T_j = 25$ °C $I_c = 100$ A
 $V_{GE} = -2 / 18$ V $T_j = 125$ °C
 $R_{gon} = 2$ Ω $T_j = 150$ °C

figure 12. FWD



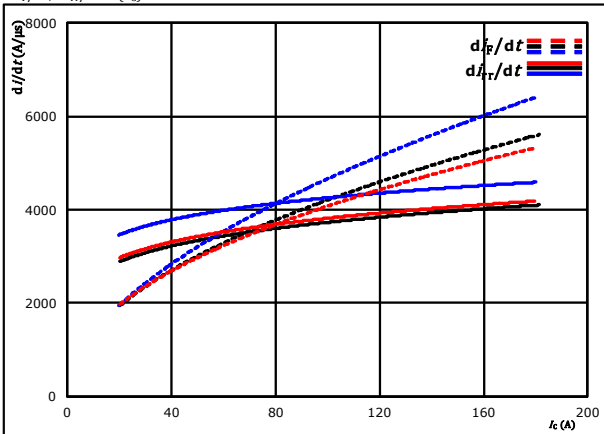
At $V_{CE} = 600$ V $T_j = 25$ °C $I_c = 100$ A
 $V_{GE} = -2 / 18$ V $T_j = 125$ °C
 $I_c = 100$ A $T_j = 150$ °C



AC Real Short Switching Characteristics

figure 13. FWD

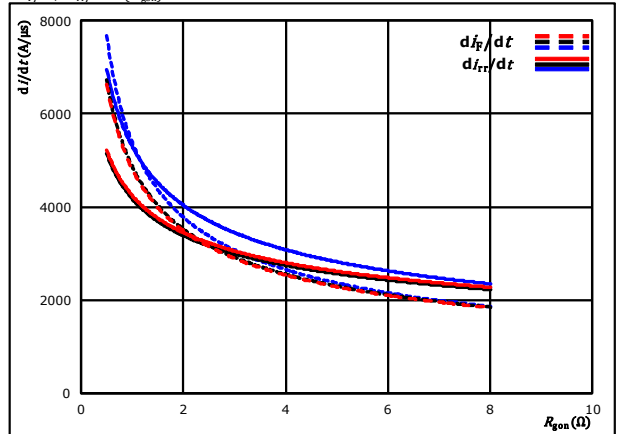
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_{rr}/dt = f(I_c)$



At $V_{CE} = 600$ V $T_j = 25$ °C
 $V_{GE} = -2 / 18$ V $T_j = 125$ °C
 $R_{g(on)} = 2$ Ω $T_j = 150$ °C

figure 14. FWD

Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
 $di_f/dt, di_{rr}/dt = f(R_{g(on)})$

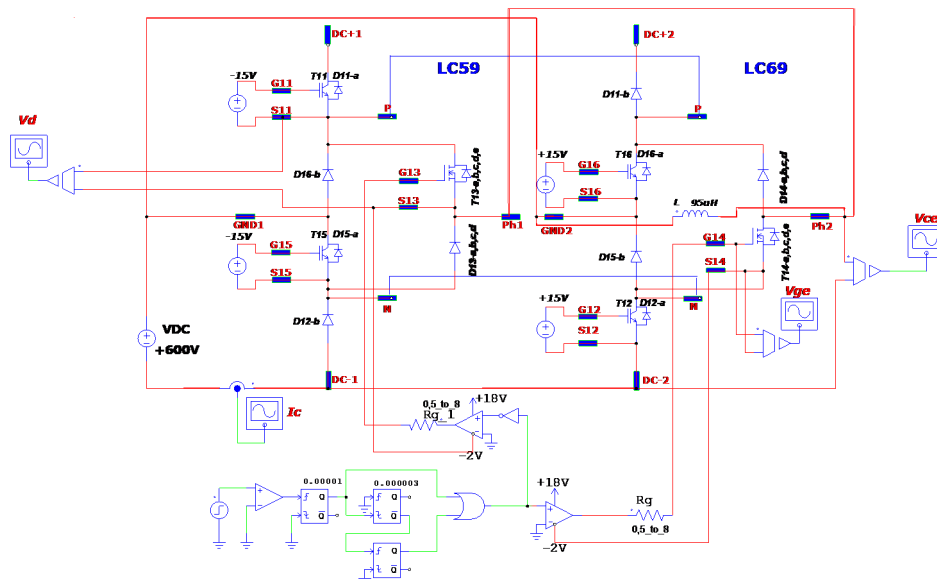


At $V_{CE} = 600$ V $T_j = 25$ °C
 $V_{GE} = -2 / 18$ V $T_j = 125$ °C
 $I_c = 100$ A $T_j = 150$ °C

AC Real Short measurement circuit

figure 1.

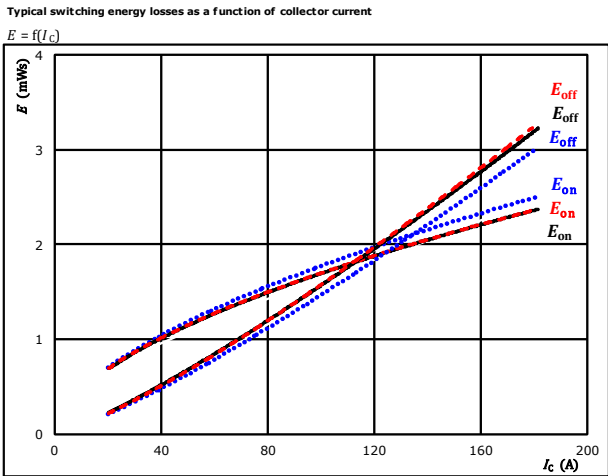
AC Real PN Short Configuration





AC Reactive Short Switching Characteristics

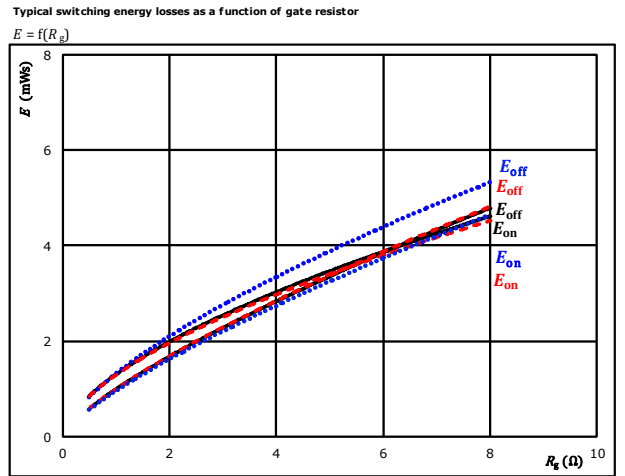
figure 1. IGBT



With an inductive load at

$V_{CE} = 600$ V	$T_j: 25$ °C	.....
$V_{GE} = -2 / 18$ V	$T_j: 125$ °C	————
$R_{gon} = 2$ Ω	$T_j: 150$ °C	-----
$R_{goff} = 2$ Ω		

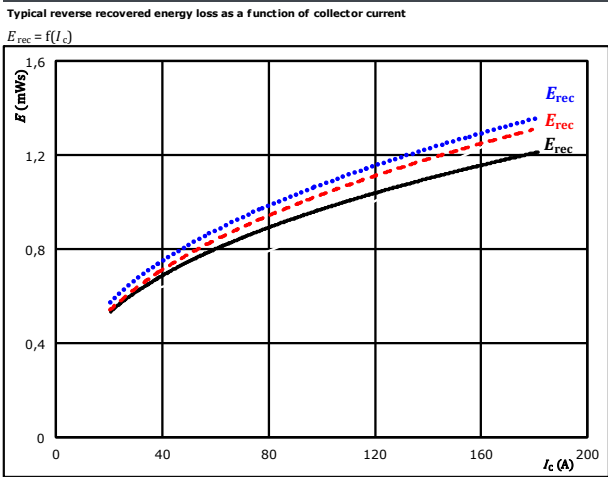
figure 2. IGBT



With an inductive load at

$V_{CE} = 600$ V	$T_j: 25$ °C	.....
$V_{GE} = -2 / 18$ V	$T_j: 125$ °C	————
$I_c = 100$ A	$T_j: 150$ °C	-----

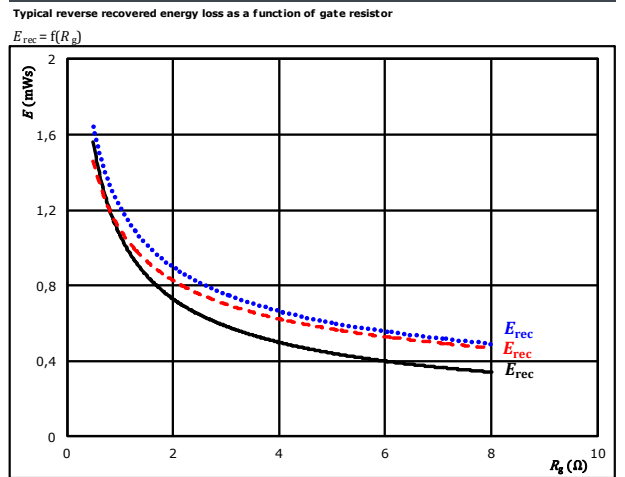
figure 3. FWD



With an inductive load at

$V_{CE} = 600$ V	$T_j: 25$ °C	.....
$V_{GE} = -2 / 18$ V	$T_j: 125$ °C	————
$R_{gon} = 2$ Ω	$T_j: 150$ °C	-----

figure 4. FWD



With an inductive load at

$V_{CE} = 600$ V	$T_j: 25$ °C	.....
$V_{GE} = -2 / 18$ V	$T_j: 125$ °C	————
$I_c = 100$ A	$T_j: 150$ °C	-----

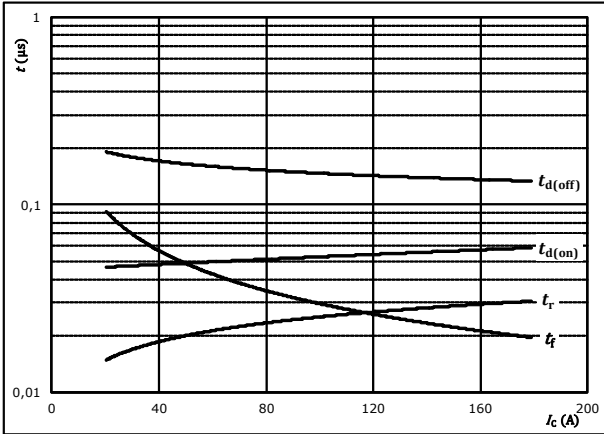


AC Reactive Short Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_c)$$



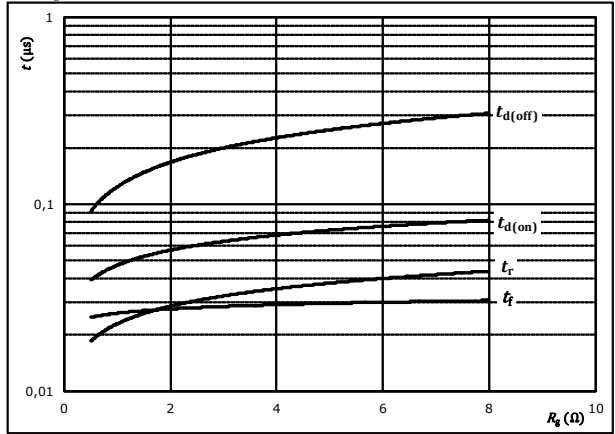
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	600	V
$V_{GE} =$	-2 / 18	V
$R_{g(on)} =$	2	Ω
$R_{g(off)} =$	2	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



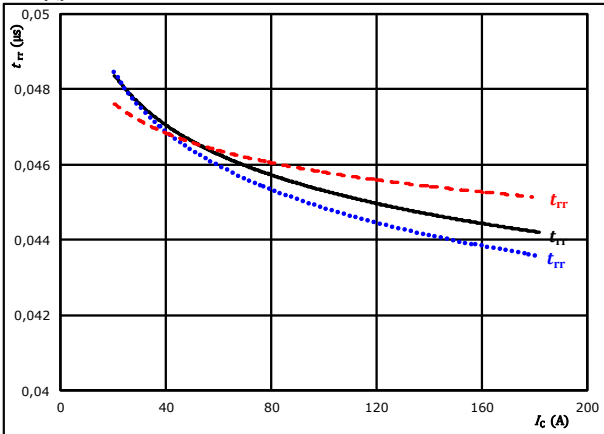
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	600	V
$V_{GE} =$	-2 / 18	V
$I_c =$	100	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$$t_{rr} = f(I_c)$$

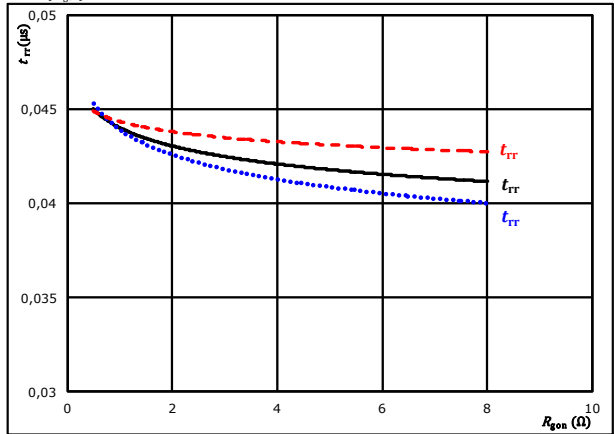


At	$V_{CE} =$	600	V	$T_j:$	25 °C	.....
	$V_{GE} =$	-2 / 18	V		125 °C	————
	$R_{g(on)} =$	2	Ω		150 °C	- - - -

figure 8. FWD

Typical reverse recovery time as a function of IGBT turn on gate resistor

$$t_{rr} = f(R_{g(on)})$$



At	$V_{CE} =$	600	V	$T_j:$	25 °C	.....
	$V_{GE} =$	-2 / 18	V		125 °C	————
	$I_c =$	100	A		150 °C	- - - -



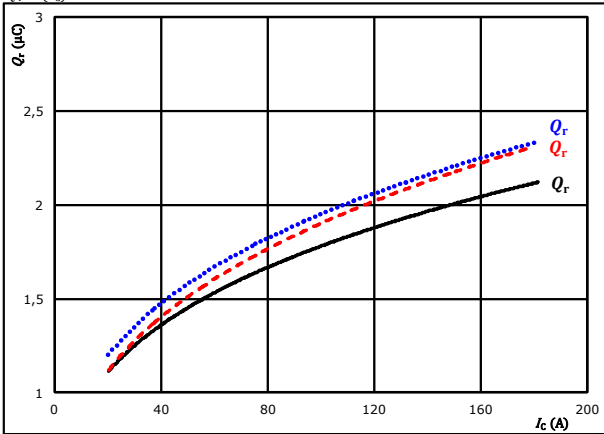
Vincotech

AC Reactive Short Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$

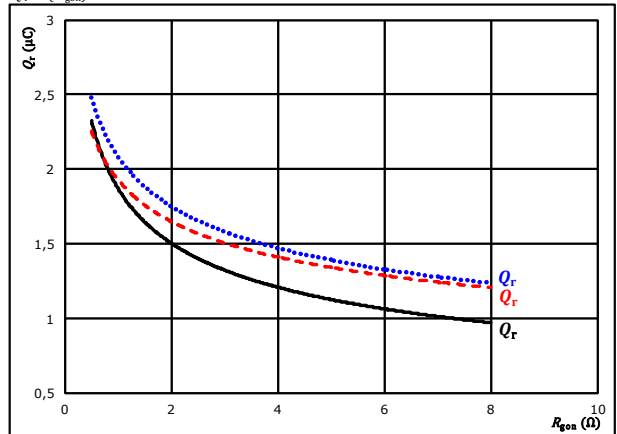


At $V_{CE} = 600$ V $T_j = 25$ °C $V_{GE} = -2 / 18$ V $T_j = 125$ °C $R_{gdn} = 2$ Ω $T_j = 150$ °C

figure 10. FWD

Typical recovered charge as a function of IGBT turn on gate resistor

$$Q_r = f(R_{gdn})$$

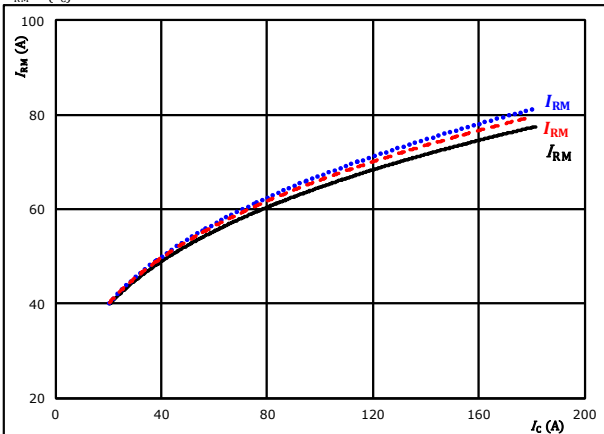


At $V_{CE} = 600$ V $T_j = 25$ °C $V_{GE} = -2 / 18$ V $T_j = 125$ °C $I_c = 100$ A $T_j = 150$ °C

figure 11. FWD

Typical peak reverse recovery current as a function of collector current

$$I_{RM} = f(I_c)$$

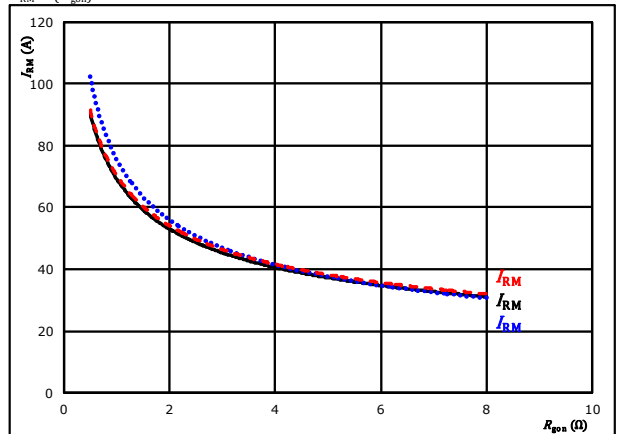


At $V_{CE} = 600$ V $T_j = 25$ °C $V_{GE} = -2 / 18$ V $T_j = 125$ °C $R_{gdn} = 2$ Ω $T_j = 150$ °C

figure 12. FWD

Typical peak reverse recovery current as a function of IGBT turn on gate resistor

$$I_{RM} = f(R_{gdn})$$



At $V_{CE} = 600$ V $T_j = 25$ °C $V_{GE} = -2 / 18$ V $T_j = 125$ °C $I_c = 100$ A $T_j = 150$ °C

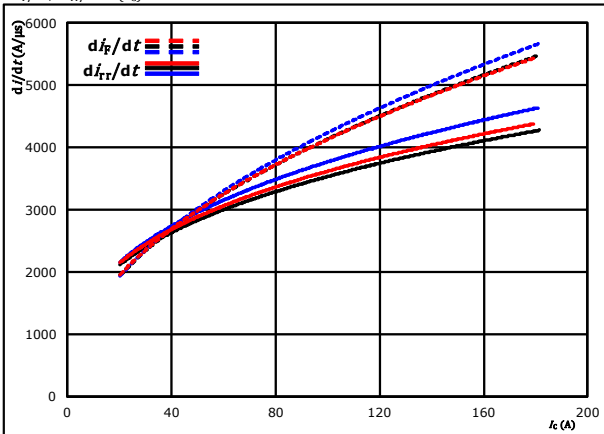


Vincotech

AC Reactive Short Switching Characteristics

figure 13. FWD

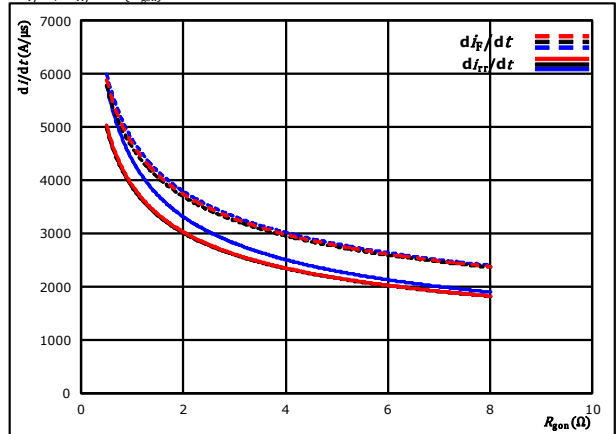
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_{rr}/dt = f(I_c)$



At $V_{CE} = 600$ V $T_j = 25$ °C
 $V_{GE} = -2 / 18$ V $T_j = 125$ °C
 $R_{g(on)} = 2$ Ω $T_j = 150$ °C

figure 14. FWD

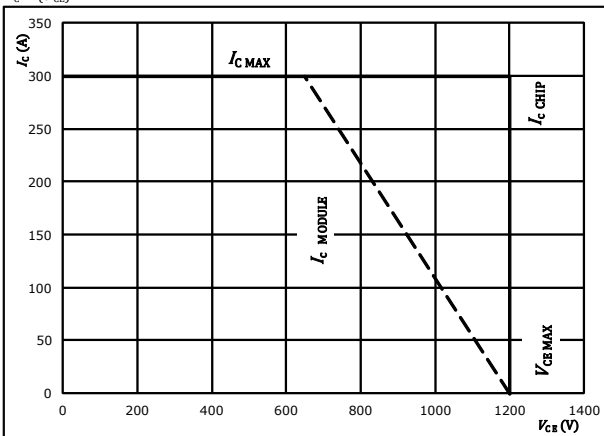
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
 $di_f/dt, di_{rr}/dt = f(R_{g(on)})$



At $V_{CE} = 600$ V $T_j = 25$ °C
 $V_{GE} = -2 / 18$ V $T_j = 125$ °C
 $I_c = 100$ A $T_j = 150$ °C

figure 15. IGBT

Reverse bias safe operating area
 $I_c = f(V_{CE})$



At $T_j = 125$ °C
 $R_{g(on)} = 2$ Ω
 $R_{g(off)} = 2$ Ω



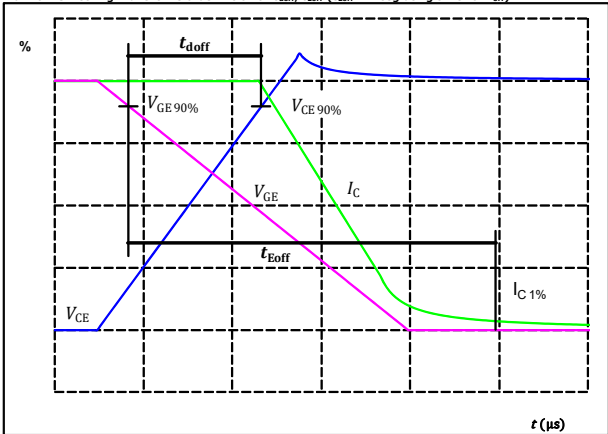
AC Switching Definitions

General conditions

T_j	=	125 °C
R_{gon}	=	2 Ω
R_{goff}	=	2 Ω

figure 1. IGBT

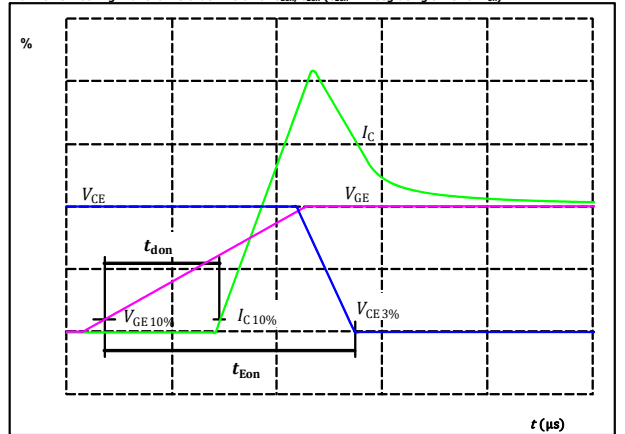
Turn-off Switching Waveforms & definition of t_{doff} , t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{CE}(0\%) =$	-2	V
$V_{GE}(100\%) =$	18	V
$V_C(100\%) =$	600	V
$I_C(100\%) =$	100	A
$t_{doff} =$	144	ns

figure 2. IGBT

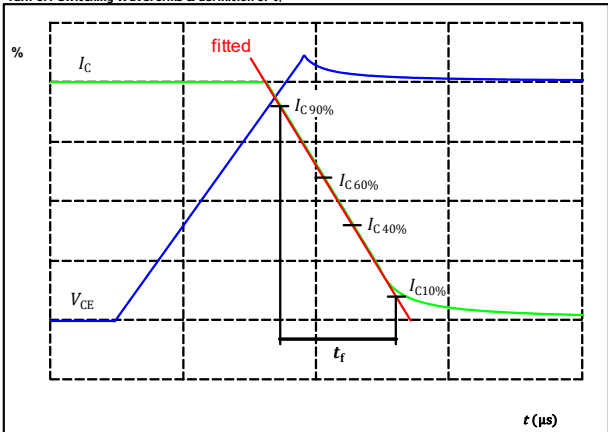
Turn-on Switching Waveforms & definition of t_{don} , t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{CE}(0\%) =$	-2	V
$V_{GE}(100\%) =$	18	V
$V_C(100\%) =$	600	V
$I_C(100\%) =$	100	A
$t_{don} =$	55	ns

figure 3. IGBT

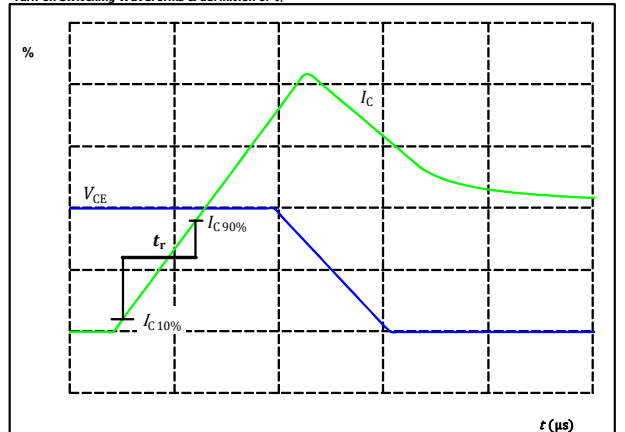
Turn-off Switching Waveforms & definition of t_r



$V_C(100\%) =$	600	V
$I_C(100\%) =$	100	A
$t_r =$	25	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r



$V_C(100\%) =$	600	V
$I_C(100\%) =$	100	A
$t_r =$	25	ns

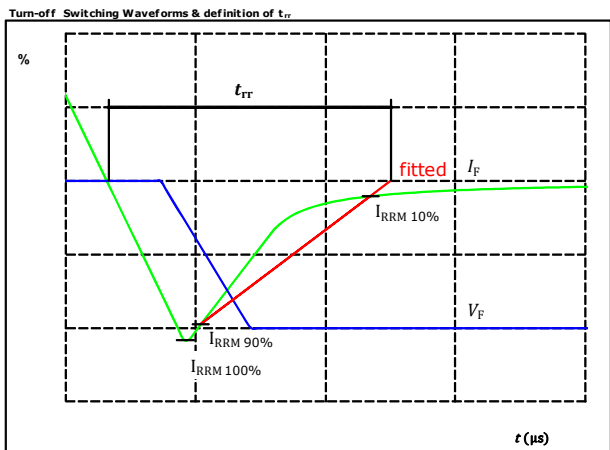


Vincotech

10-PG12NAB008MR02-LC59F36T
10-PG12NAC008MR02-LC69F36T
 datasheet

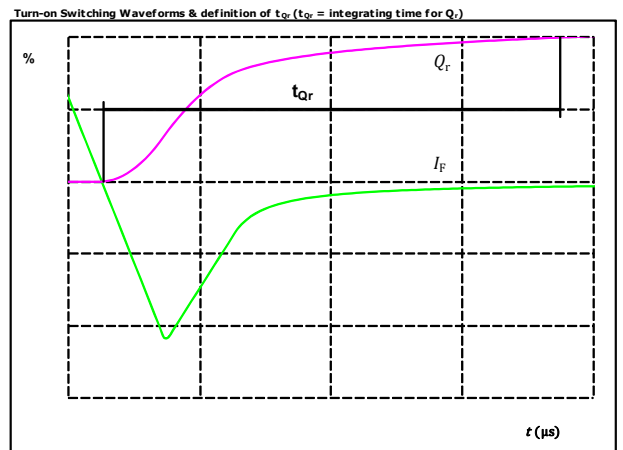
AC Switching Characteristics

figure 5. FWD



$V_F(100\%) =$	600	V
$I_F(100\%) =$	100	A
$I_{RRM}(100\%) =$	61	A
$t_{rr} =$	44	ns

figure 6. FWD

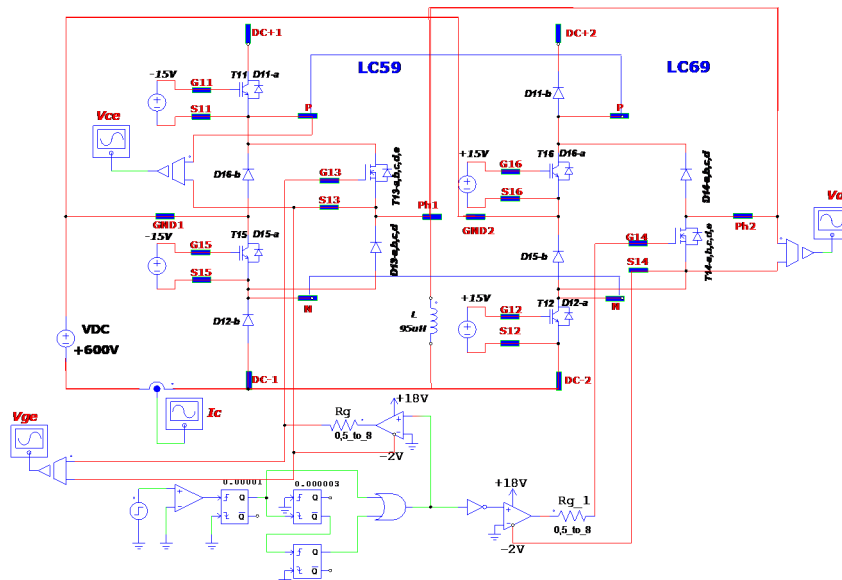


$I_F(100\%) =$	100	A
$Q_r(100\%) =$	1,63	μC

AC Reactive Short measurement circuit

figure 1.

AC Reactive PN Short Configuration



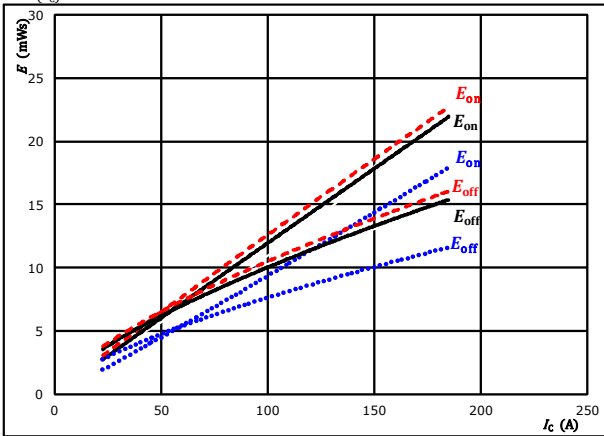


Neutral Switching Characteristics

figure 1. IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_C)$$

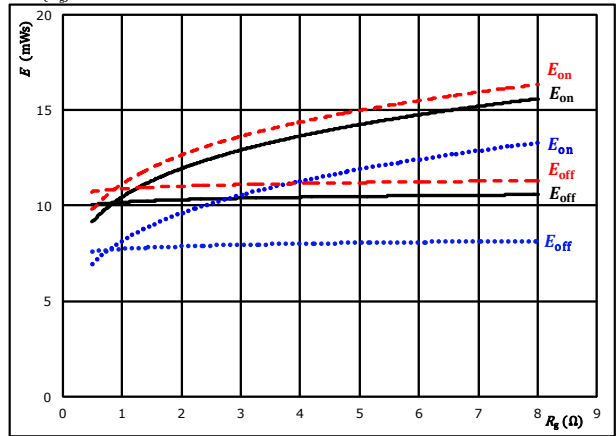


With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{g\text{on}} = 2$ Ω
 $R_{g\text{off}} = 2$ Ω
 $T_j: 25$ °C
 125 °C
 150 °C

figure 2. IGBT

Typical switching energy losses as a function of gate resistor

$$E = f(R_g)$$

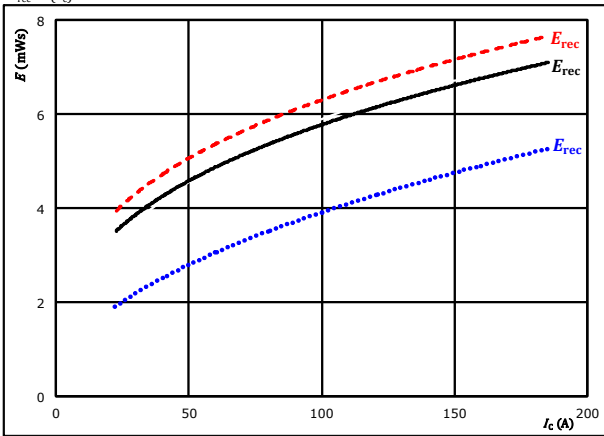


With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 100$ A
 $T_j: 25$ °C
 125 °C
 150 °C

figure 3. FWD

Typical reverse recovered energy loss as a function of collector current

$$E_{rec} = f(I_C)$$

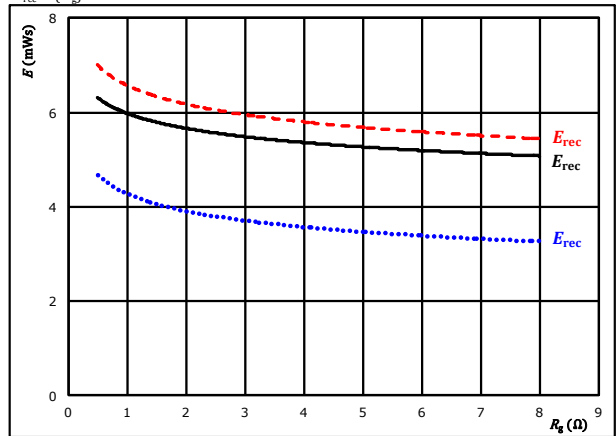


With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{g\text{on}} = 2$ Ω
 $T_j: 25$ °C
 125 °C
 150 °C

figure 4. FWD

Typical reverse recovered energy loss as a function of gate resistor

$$E_{rec} = f(R_g)$$



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 100$ A
 $T_j: 25$ °C
 125 °C
 150 °C



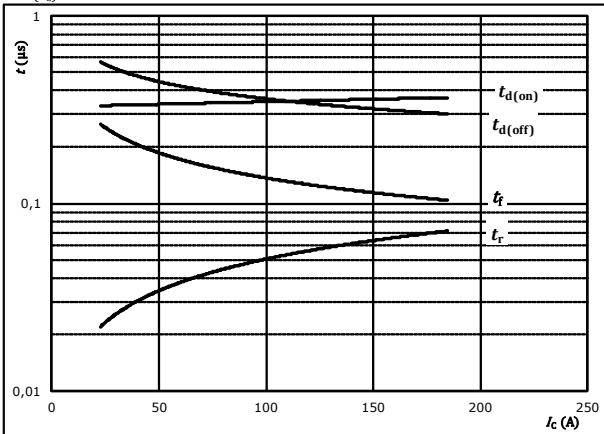
Vincotech

Neutral Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



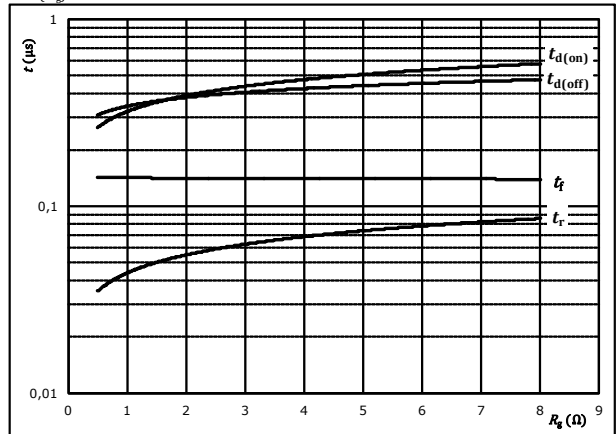
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	600	V
$V_{GE} =$	±15	V
$R_{g(on)} =$	2	Ω
$R_{g(off)} =$	2	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



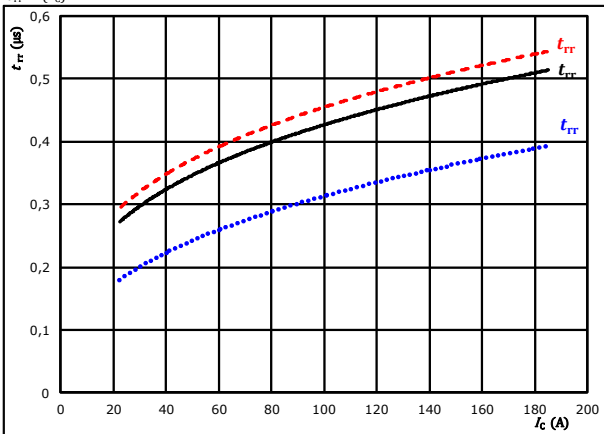
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	600	V
$V_{GE} =$	±15	V
$I_C =$	100	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$$t_{rr} = f(I_C)$$

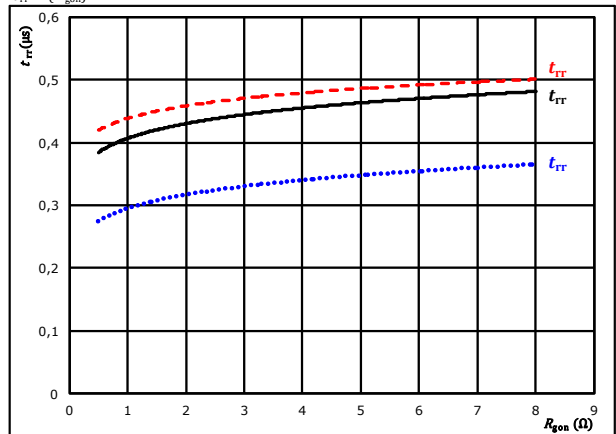


At	$V_{CE} =$	600	V	$T_j:$	25 °C	.....
	$V_{GE} =$	±15	V		125 °C	————
	$R_{g(on)} =$	2	Ω		150 °C	- - - -

figure 8. FWD

Typical reverse recovery time as a function of IGBT turn on gate resistor

$$t_{rr} = f(R_{g(on)})$$



At	$V_{CE} =$	600	V	$T_j:$	25 °C	.....
	$V_{GE} =$	±15	V		125 °C	————
	$I_C =$	100	A		150 °C	- - - -

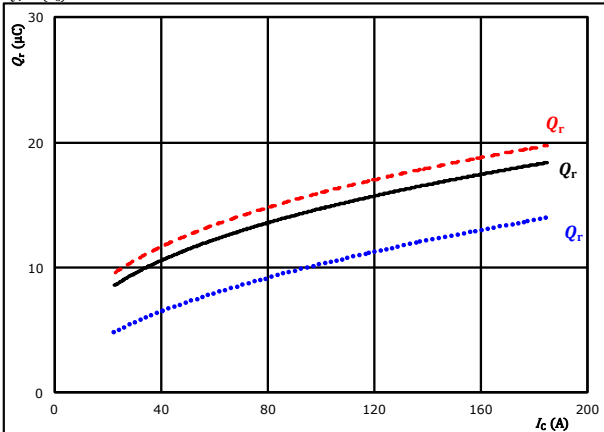


Neutral Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$

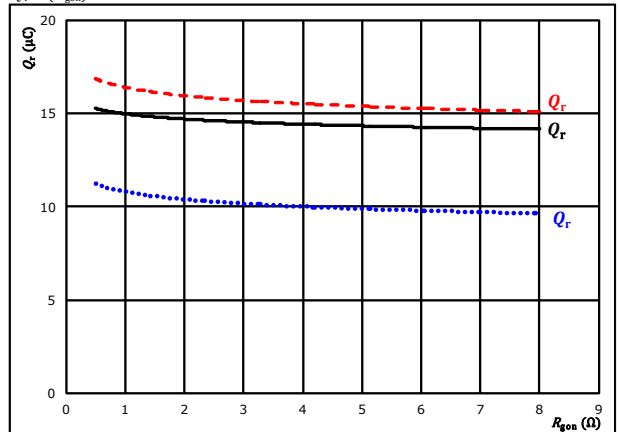


At $V_{CE} = 600$ V $T_j = 25$ °C (dotted blue)
 $V_{GE} = \pm 15$ V $T_j = 125$ °C (solid black)
 $R_{gon} = 2$ Ω $T_j = 150$ °C (dashed red)

figure 10. FWD

Typical recovered charge as a function of IGBT turn on gate resistor

$$Q_r = f(R_{gon})$$

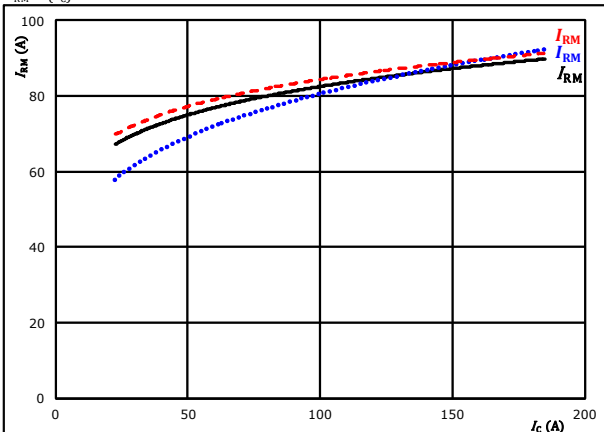


At $V_{CE} = 600$ V $T_j = 25$ °C (dotted blue)
 $V_{GE} = \pm 15$ V $T_j = 125$ °C (solid black)
 $I_c = 100$ A $T_j = 150$ °C (dashed red)

figure 11. FWD

Typical peak reverse recovery current current as a function of collector current

$$I_{RM} = f(I_c)$$

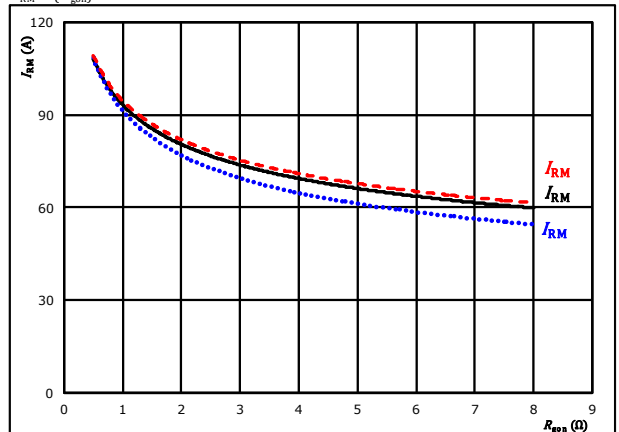


At $V_{CE} = 600$ V $T_j = 25$ °C (dotted blue)
 $V_{GE} = \pm 15$ V $T_j = 125$ °C (solid black)
 $R_{gon} = 2$ Ω $T_j = 150$ °C (dashed red)

figure 12. FWD

Typical peak reverse recovery current as a function of IGBT turn on gate resistor

$$I_{RM} = f(R_{gon})$$



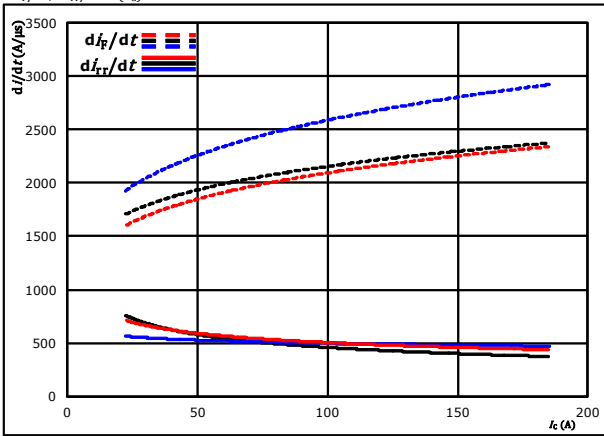
At $V_{CE} = 600$ V $T_j = 25$ °C (dotted blue)
 $V_{GE} = \pm 15$ V $T_j = 125$ °C (solid black)
 $I_c = 100$ A $T_j = 150$ °C (dashed red)



Neutral Switching Characteristics

figure 13. FWD

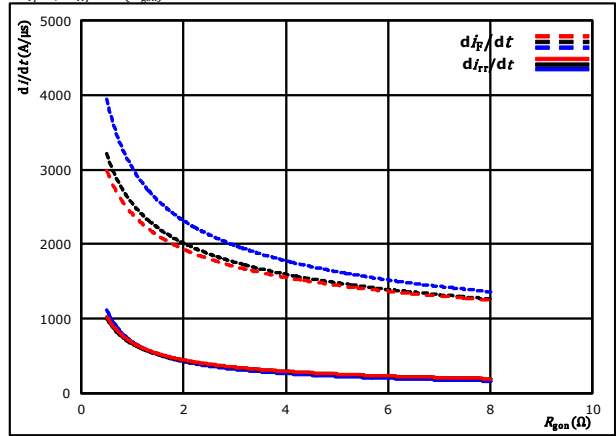
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_{rr}/dt = f(I_c)$



At $V_{CE} = 600$ V $T_j = 25$ °C
 $V_{GE} = \pm 15$ V $T_j = 125$ °C
 $R_{gon} = 2$ Ω $T_j = 150$ °C

figure 14. FWD

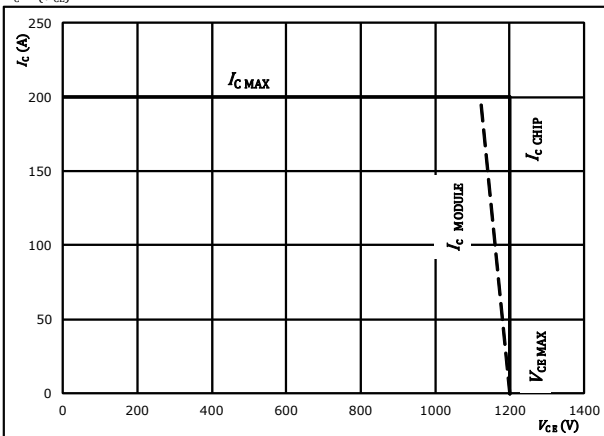
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
 $di_f/dt, di_{rr}/dt = f(R_{gon})$



At $V_{CE} = 600$ V $T_j = 25$ °C
 $V_{GE} = \pm 15$ V $T_j = 125$ °C
 $I_c = 100$ A $T_j = 150$ °C

figure 15. IGBT

Reverse bias safe operating area
 $I_c = f(V_{CB})$



At $T_j = 125$ °C
 $R_{gon} = 2$ Ω
 $R_{goff} = 2$ Ω

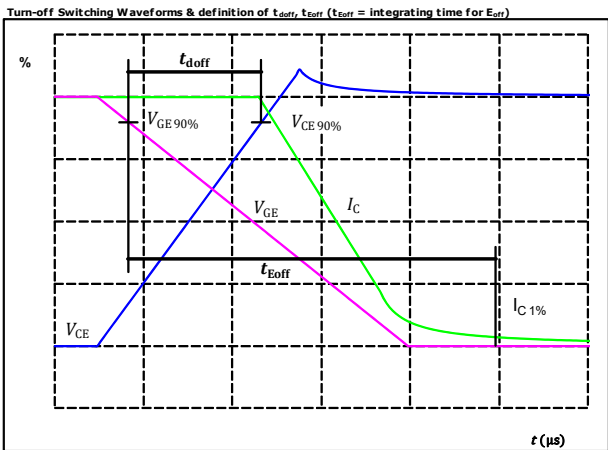


Neutral Switching Definitions

General conditions

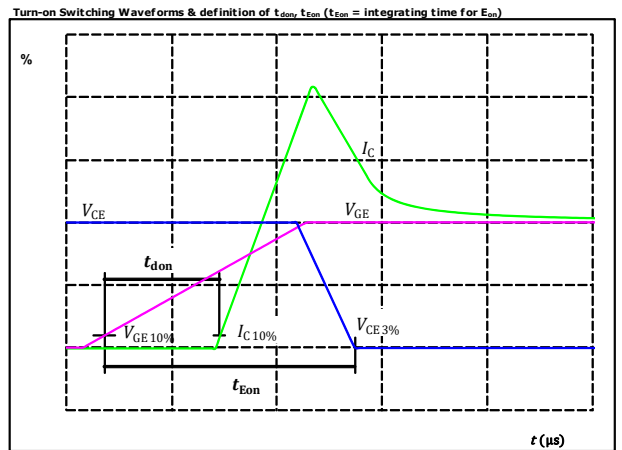
T_j	=	125 °C
R_{gon}	=	2 Ω
R_{goff}	=	2 Ω

figure 1. IGBT



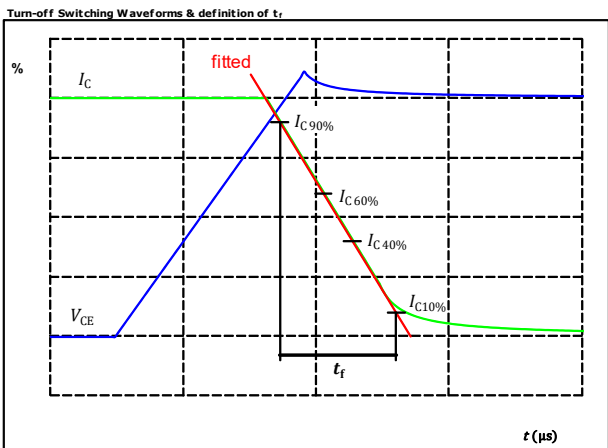
$V_{CE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	600	V
$I_C(100\%) =$	100	A
$t_{doff} =$	351	ns

figure 2. IGBT



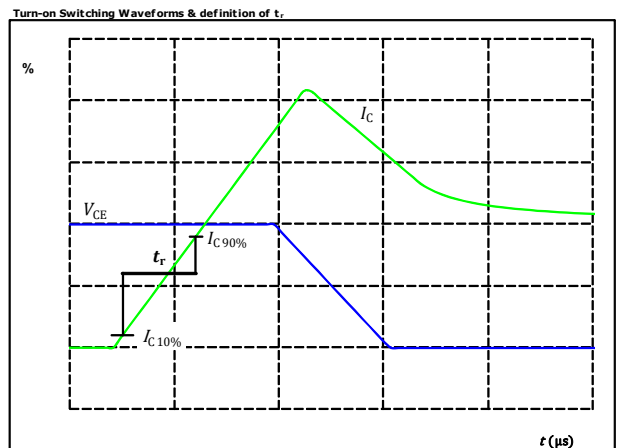
$V_{CE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	600	V
$I_C(100\%) =$	100	A
$t_{don} =$	349	ns

figure 3. IGBT



$V_C(100\%) =$	600	V
$I_C(100\%) =$	100	A
$t_f =$	139	ns

figure 4. IGBT



$V_C(100\%) =$	600	V
$I_C(100\%) =$	100	A
$t_r =$	47	ns

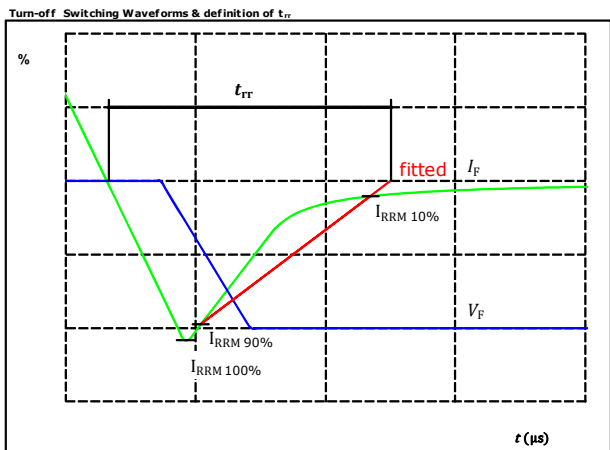


Vincotech

10-PG12NAB008MR02-LC59F36T
10-PG12NAC008MR02-LC69F36T
 datasheet

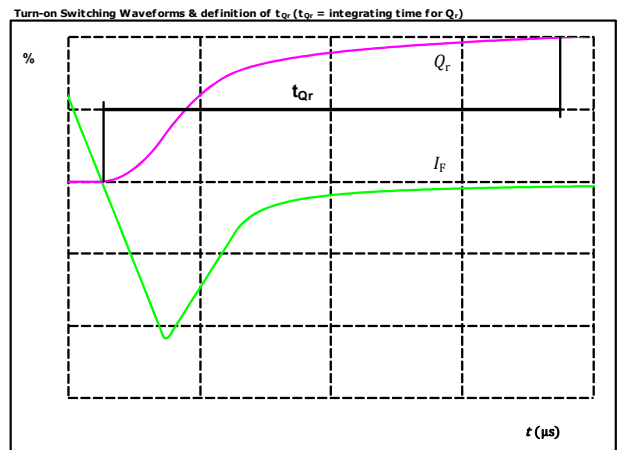
Neutral Switching Characteristics

figure 5. FWD



$V_F(100\%) =$	600	V
$I_F(100\%) =$	100	A
$I_{RRM}(100\%) =$	86	A
$t_{rr} =$	419	ns

figure 6. FWD

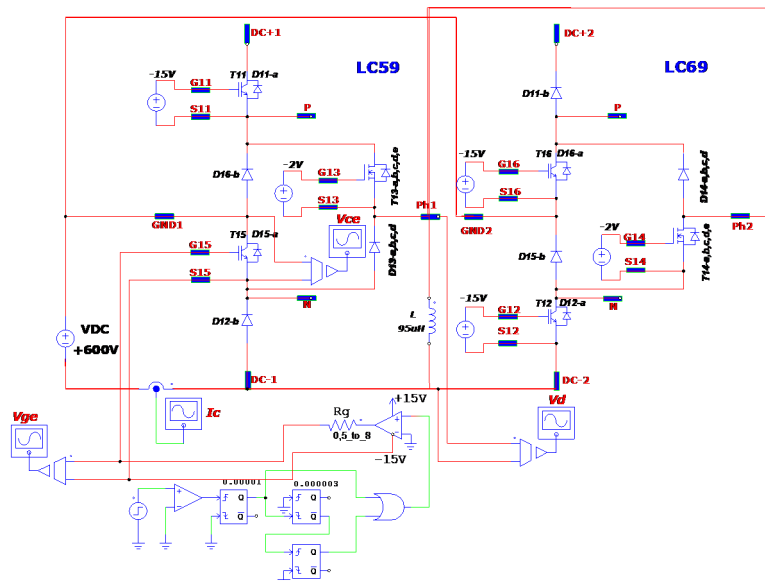


$I_F(100\%) =$	100	A
$Q_r(100\%) =$	15,02	μC

Neutral Switching measurement circuit

figure 1.

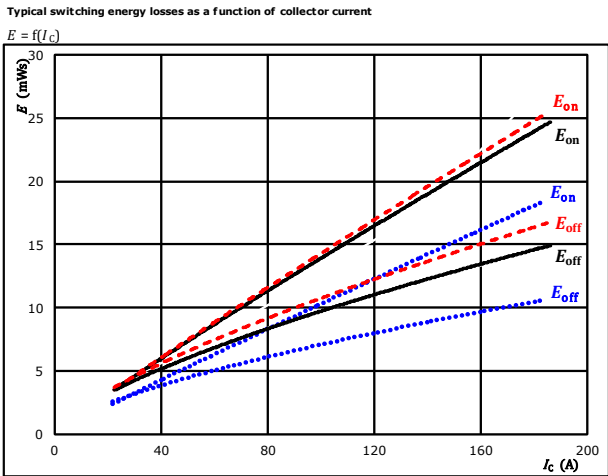
NEUTRAL POINT SWITCH





DC Open Switching Characteristics

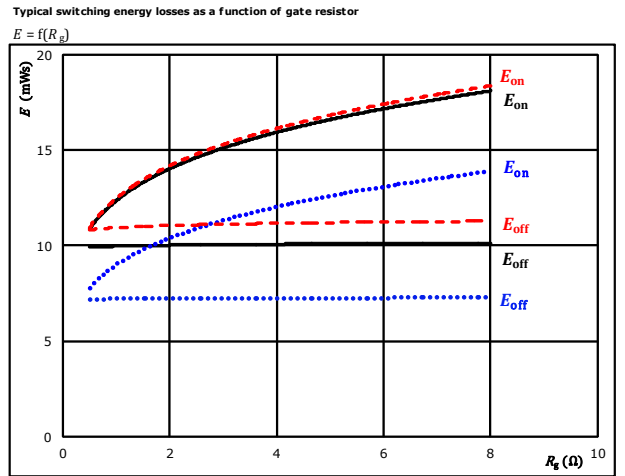
figure 1. IGBT



With an inductive load at

$V_{CE} = 600$ V	$T_j: 25$ °C	.....
$V_{GE} = \pm 15$ V	125 °C	————
$R_{g\text{on}} = 2$ Ω	150 °C	-----
$R_{g\text{off}} = 2$ Ω		

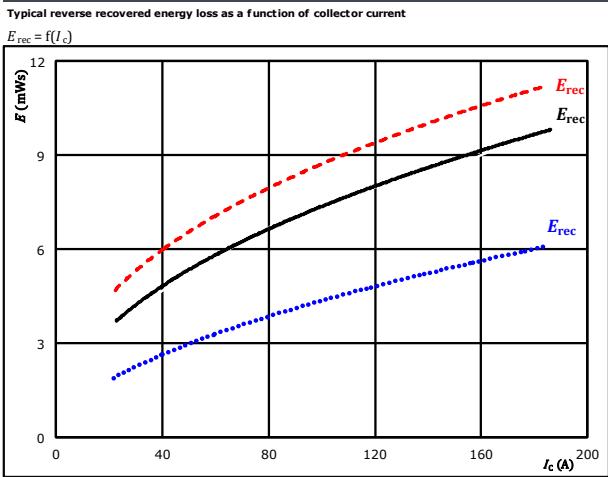
figure 2. IGBT



With an inductive load at

$V_{CE} = 600$ V	$T_j: 25$ °C	.....
$V_{GE} = \pm 15$ V	125 °C	————
$I_C = 100$ A	150 °C	-----

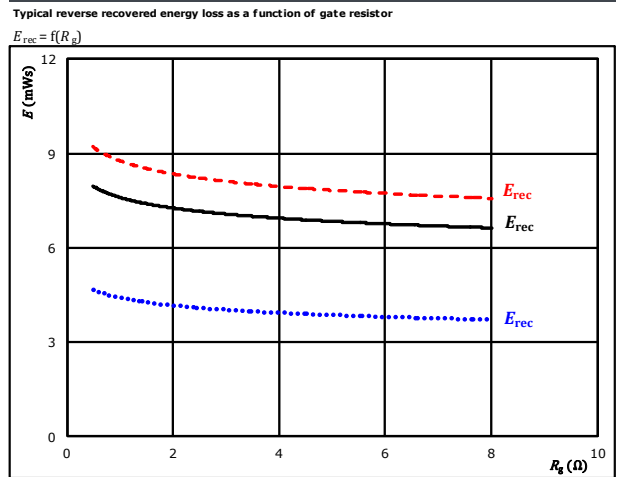
figure 3. FWD



With an inductive load at

$V_{CE} = 600$ V	$T_j: 25$ °C	.....
$V_{GE} = \pm 15$ V	125 °C	————
$R_{g\text{on}} = 2$ Ω	150 °C	-----

figure 4. FWD



With an inductive load at

$V_{CE} = 600$ V	$T_j: 25$ °C	.....
$V_{GE} = \pm 15$ V	125 °C	————
$I_C = 100$ A	150 °C	-----

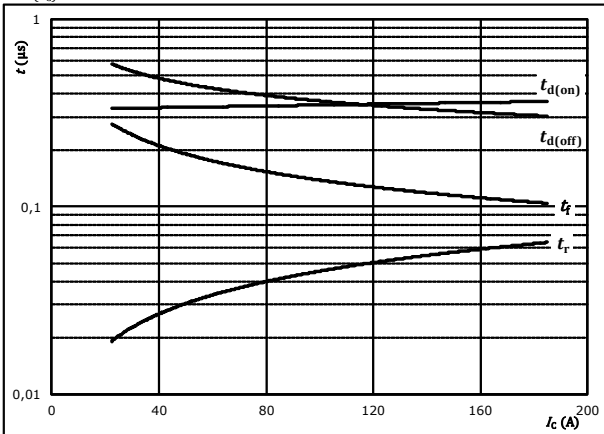


DC Open Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_c)$$



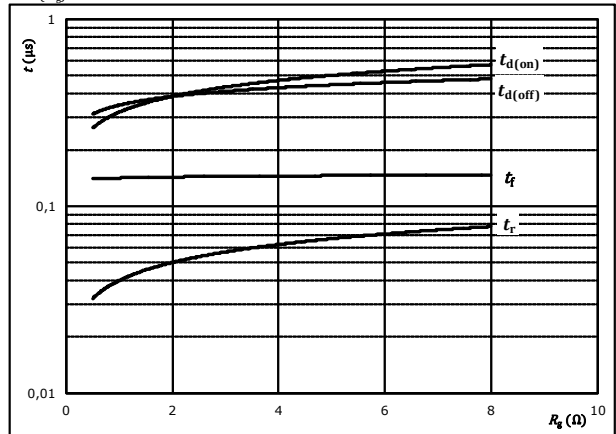
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	600	V
$V_{GE} =$	±15	V
$R_{g(on)} =$	2	Ω
$R_{g(off)} =$	2	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



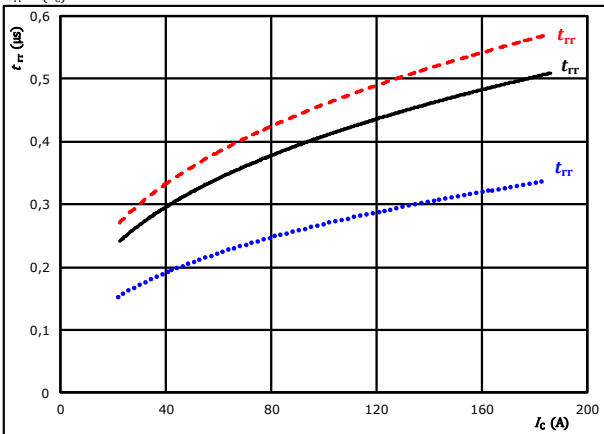
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	600	V
$V_{GE} =$	±15	V
$I_c =$	100	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$$t_{rr} = f(I_c)$$

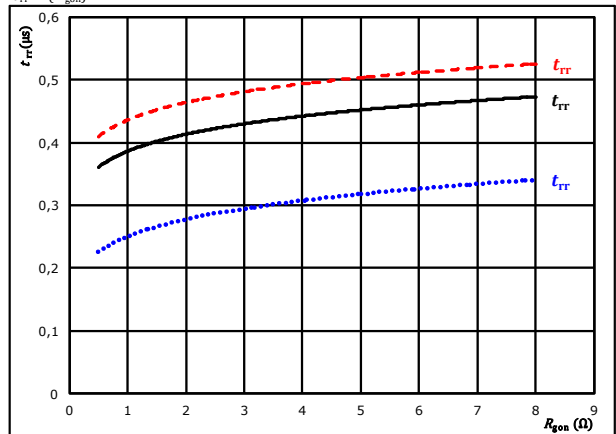


At	$V_{CE} =$	600	V	$T_j:$	25 °C	.....
	$V_{GE} =$	±15	V		125 °C	————
	$R_{g(on)} =$	2	Ω		150 °C	-----

figure 8. FWD

Typical reverse recovery time as a function of IGBT turn on gate resistor

$$t_{rr} = f(R_{g(on)})$$



At	$V_{CE} =$	600	V	$T_j:$	25 °C	.....
	$V_{GE} =$	±15	V		125 °C	————
	$I_c =$	100	A		150 °C	-----

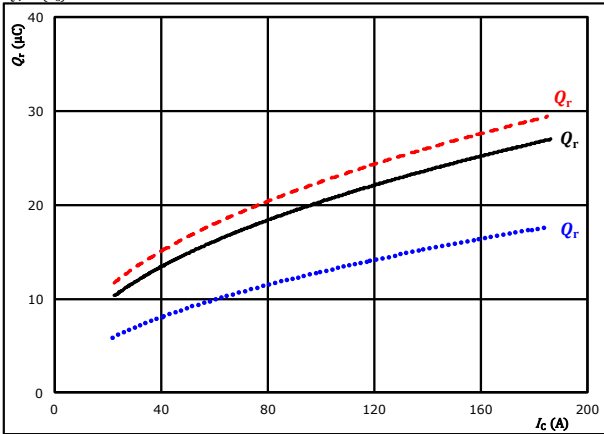


DC Open Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$

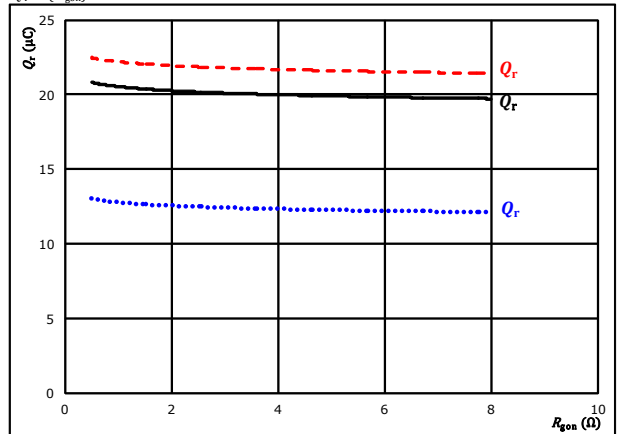


At $V_{CE} = 600$ V $T_j = 25$ °C (dotted blue)
 $V_{GE} = \pm 15$ V $T_j = 125$ °C (solid black)
 $R_{gon} = 2$ Ω $T_j = 150$ °C (dashed red)

figure 10. FWD

Typical recovered charge as a function of IGBT turn on gate resistor

$$Q_r = f(R_{gon})$$

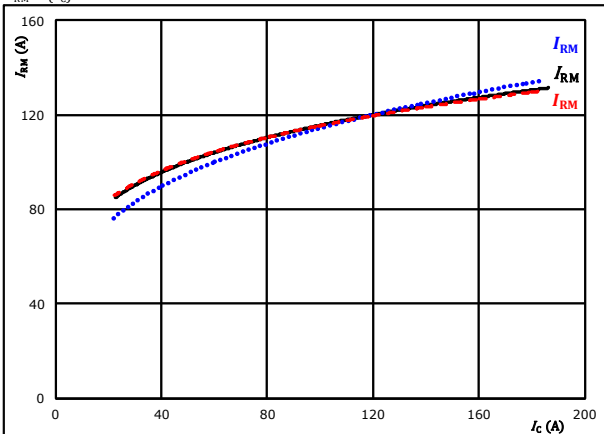


At $V_{CE} = 600$ V $T_j = 25$ °C (dotted blue)
 $V_{GE} = \pm 15$ V $T_j = 125$ °C (solid black)
 $I_c = 100$ A $T_j = 150$ °C (dashed red)

figure 11. FWD

Typical peak reverse recovery current as a function of collector current

$$I_{RM} = f(I_c)$$

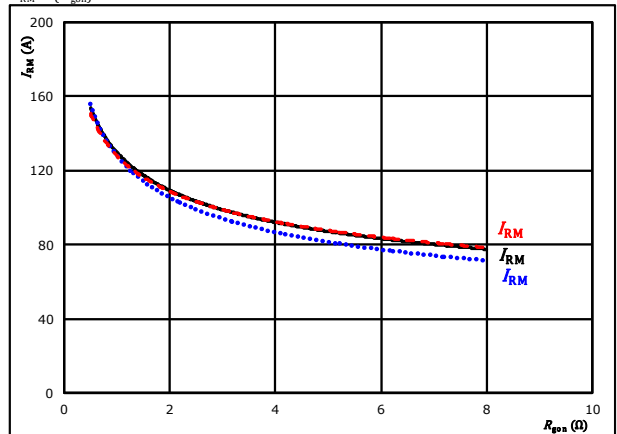


At $V_{CE} = 600$ V $T_j = 25$ °C (dotted blue)
 $V_{GE} = \pm 15$ V $T_j = 125$ °C (solid black)
 $R_{gon} = 2$ Ω $T_j = 150$ °C (dashed red)

figure 12. FWD

Typical peak reverse recovery current as a function of IGBT turn on gate resistor

$$I_{RM} = f(R_{gon})$$



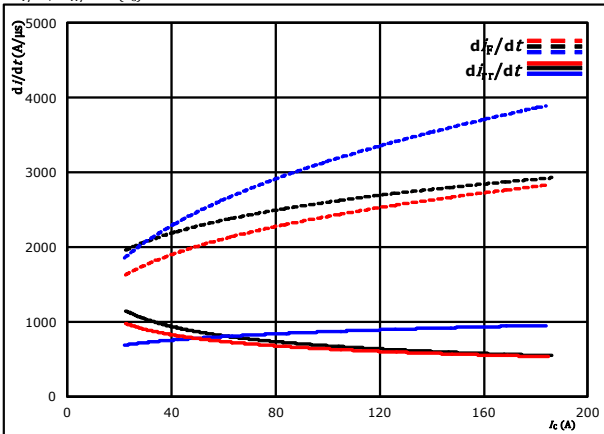
At $V_{CE} = 600$ V $T_j = 25$ °C (dotted blue)
 $V_{GE} = \pm 15$ V $T_j = 125$ °C (solid black)
 $I_c = 100$ A $T_j = 150$ °C (dashed red)



DC Open Switching Characteristics

figure 13. FWD

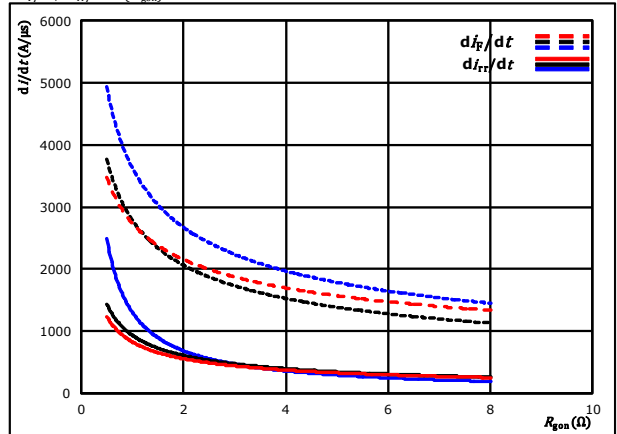
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_{rr}/dt = f(I_c)$



At $V_{CE} = 600$ V $T_j = 25$ °C
 $V_{GE} = \pm 15$ V $T_j = 125$ °C
 $R_{gpn} = 2$ Ω $T_j = 150$ °C

figure 14. FWD

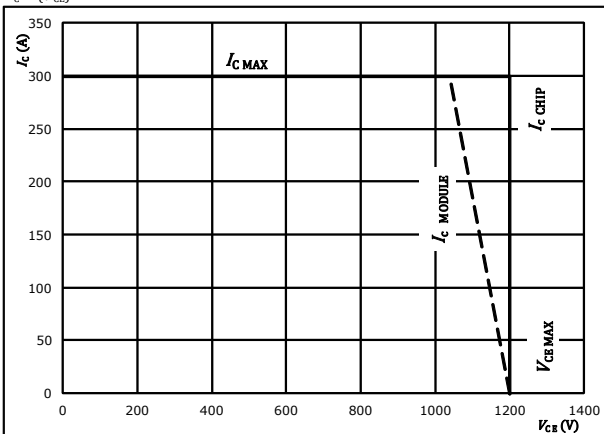
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
 $di_f/dt, di_{rr}/dt = f(R_{gon})$



At $V_{CE} = 600$ V $T_j = 25$ °C
 $V_{GE} = \pm 15$ V $T_j = 125$ °C
 $I_c = 100$ A $T_j = 150$ °C

figure 15. IGBT

Reverse bias safe operating area
 $I_c = f(V_{CB})$



At $T_j = 125$ °C
 $R_{gpn} = 2$ Ω
 $R_{goff} = 2$ Ω

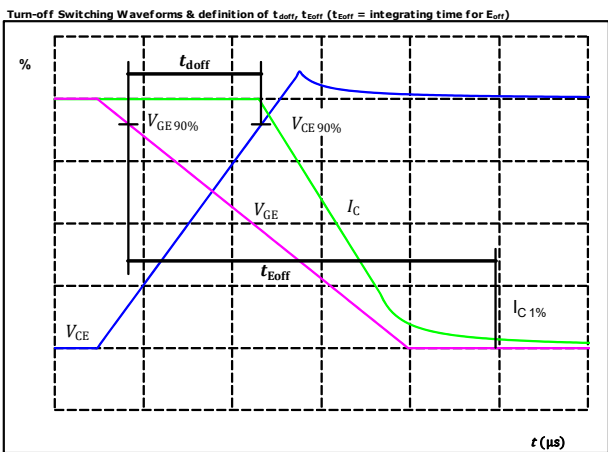


DC Open Switching Definitions

General conditions

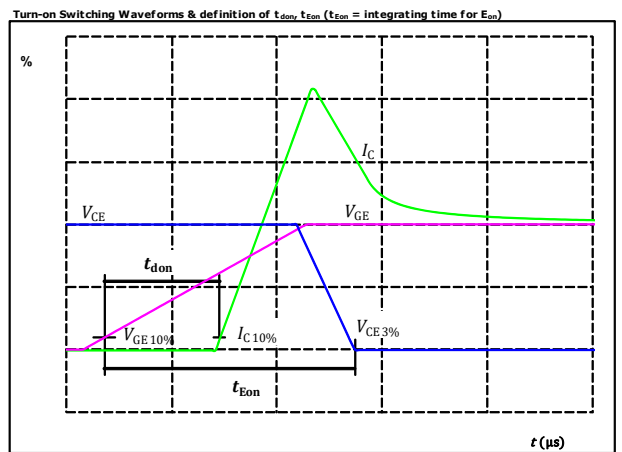
T_j	=	125 °C
R_{gon}	=	2 Ω
R_{goff}	=	2 Ω

figure 1. IGBT



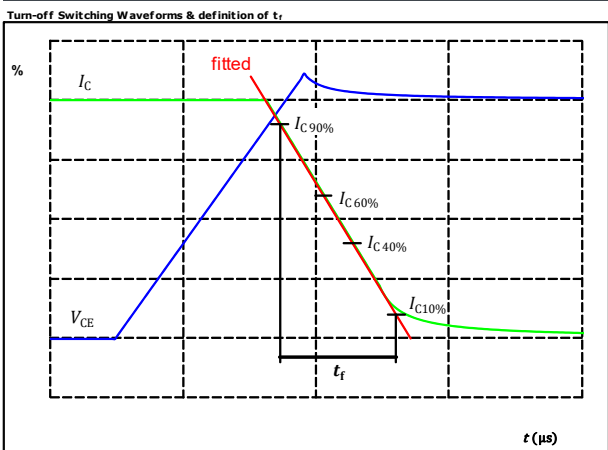
$V_{CE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	600	V
$I_C(100\%) =$	100	A
$t_{doff} =$	351	ns

figure 2. IGBT



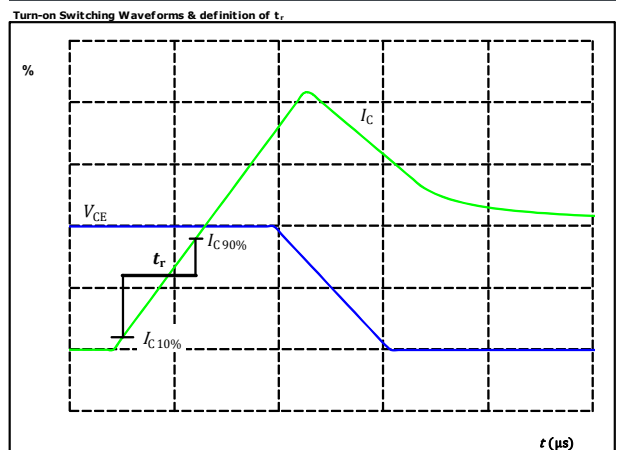
$V_{CE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	600	V
$I_C(100\%) =$	100	A
$t_{don} =$	335	ns

figure 3. IGBT



$V_C(100\%) =$	600	V
$I_C(100\%) =$	100	A
$t_f =$	136	ns

figure 4. IGBT



$V_C(100\%) =$	600	V
$I_C(100\%) =$	100	A
$t_r =$	41	ns

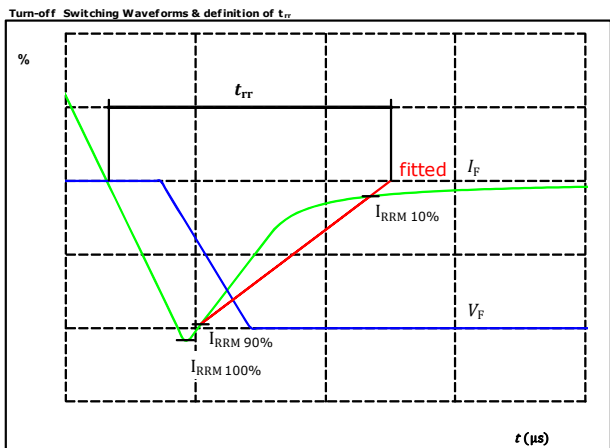


Vincotech

10-PG12NAB008MR02-LC59F36T
 10-PG12NAC008MR02-LC69F36T
 datasheet

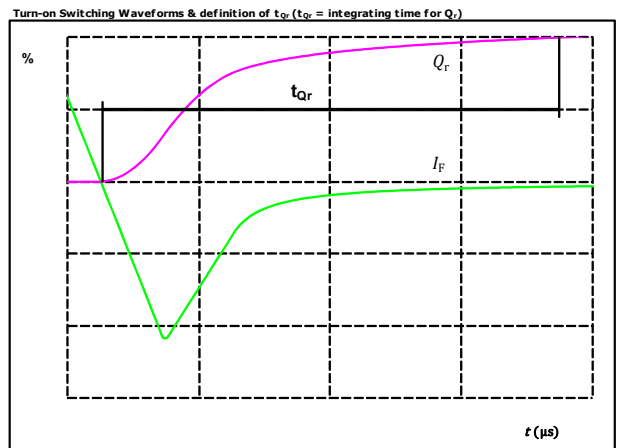
DC Open Switching Characteristics

figure 5. FWD



$V_F(100\%) =$	600	V
$I_F(100\%) =$	100	A
$I_{RRM}(100\%) =$	120	A
$t_{rr} =$	406	ns

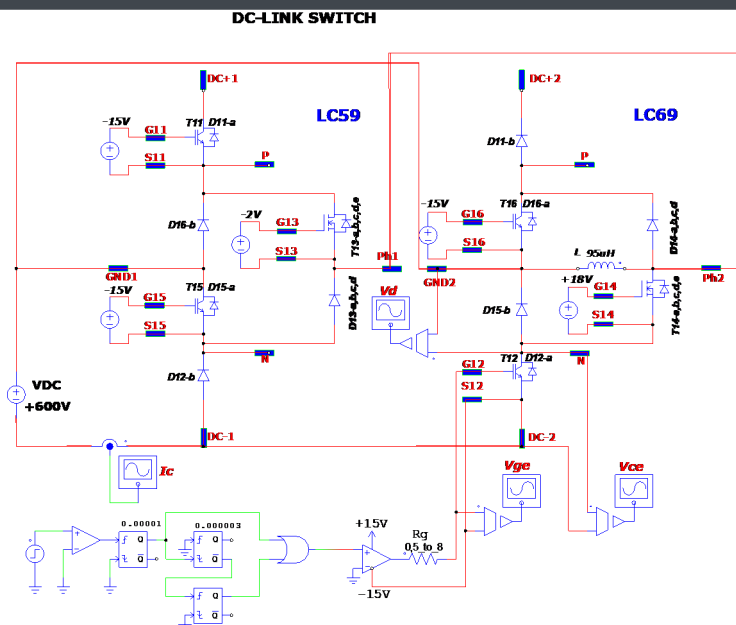
figure 6. FWD



$I_F(100\%) =$	100	A
$Q_r(100\%) =$	20,79	μC

DC Open Switching measurement circuit

figure 1.





10-PG12NAB008MR02-LC59F36T
10-PG12NAC008MR02-LC69F36T
 datasheet

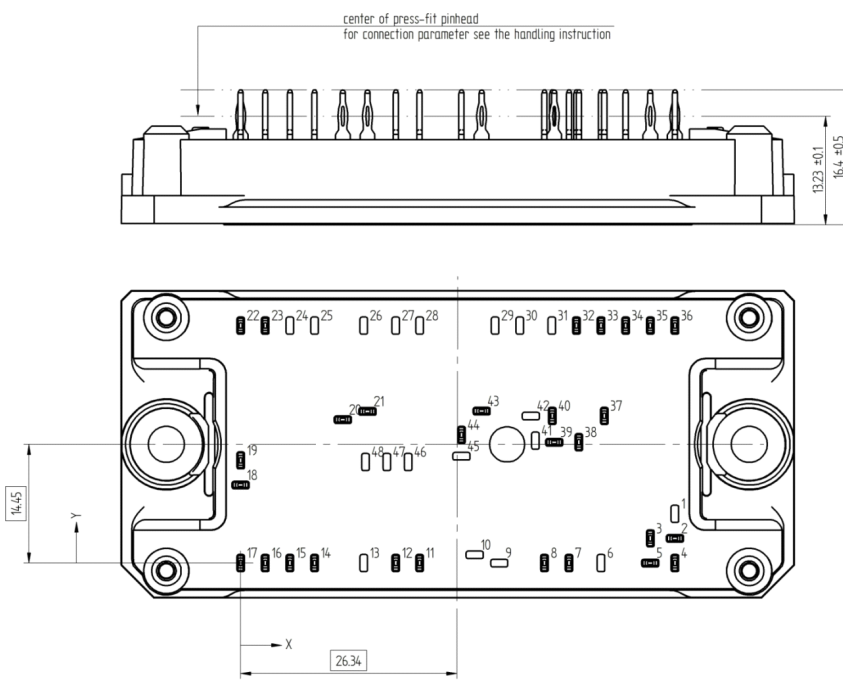
Vincotech

Ordering Code & Marking						
Version			Ordering Code			
without thermal paste 12 mm housing with press-fit pins			10-PG12NAB008MR02-LC59F36T			
with thermal paste 12 mm housing with press-fit pins			10-PG12NAB008MR02-LC59F36T-/3/			
NN-NNNNNNNNNNNN TTTTWW WWYY UL VIN LLLL SSSS						
Text	Name		Date code	UL & VIN	Lot	Serial
	NN-NNNNNNNNNNNN-TTTTWW		WWYY	UL VIN	LLLL	SSSS
Datamatrix	Type&Ver	Lot number	Serial	Date code		
	TTTTTWW	LLLLL	SSSS	WWYY		

High Side Module 10-PG12NAB008MR02-LC59F36T

Outline

Pin table			
Pin	X	Y	Function
1			Not assembled
2	52,9	3	DC-1
3	49,9	3	DC-1
4	52,9	0	DC-1
5	49,9	0	DC-1
6			Not assembled
7	40	0	GND1
8	37	0	GND1
9			Not assembled
10			Not assembled
11	21,8	0	GND1
12	18,9	0	GND1
13			Not assembled
14	9	0	DC+1
15	6	0	DC+1
16	3	0	DC+1
17	0	0	DC+1
18	0	9,5	G11
19	0	12,5	S11
20	12,45	17,45	G13
21	15,45	18,45	S13
22	0	28,9	Therm11
23	3	28,9	Therm12
24			Not assembled
25			Not assembled
26			Not assembled
27			Not assembled
28			Not assembled
29			Not assembled
30			Not assembled
31			Not assembled
32	40,9	28,9	Ph1
33	43,9	28,9	Ph1
34	46,9	28,9	Ph1
35	49,9	28,9	Ph1
36	52,9	28,9	Ph1
37	44,3	17,9	N1
38	41,2	14,7	S15
39	38,2	14,7	G15
40	37,95	17,9	N1
41			Not assembled
42			Not assembled
43	29,35	18,5	P1
44	26,9	15,6	P1
45			Not assembled
46			Not assembled
47			Not assembled
48			Not assembled

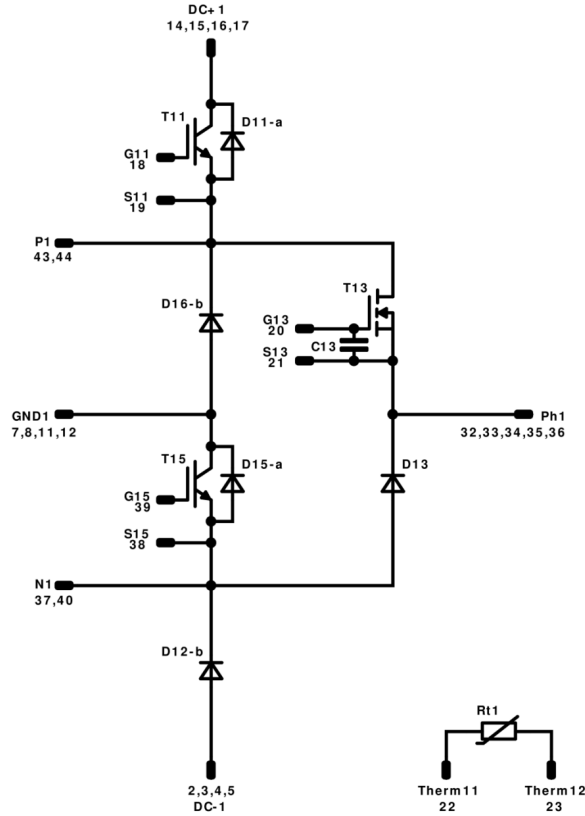


Tolerance of pinpositions: ±0,4mm at the end of pins
 Dimension of coordinate axis is only offset without tolerance



High Side Module 10-PG12NAB008MR02-LC59F36T


Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T13	MOSFET	1200 V	8 mΩ	AC Switch	
D13	FWD	1200 V	60 A	AC Diode	
T15	IGBT	1200 V	150 A	Neutral Point Switch	
D16-b	FWD	1200 V	150 A	Neutral Point Diode	
D15-a	FWD	1200 V	15 A	Neutral Point Switch Prot. Diode	
T11	IGBT	1200 V	150 A	DC-Link Switch	
D12-b	FWD	1200 V	100 A	DC-Link Diode	
D11-a	FWD	1200 V	100 A	DC-Link Switch Prot. Diode	
C13	Capacitor	25 V		Capacitor (GS)	
Rt1	NTC			Thermistor	

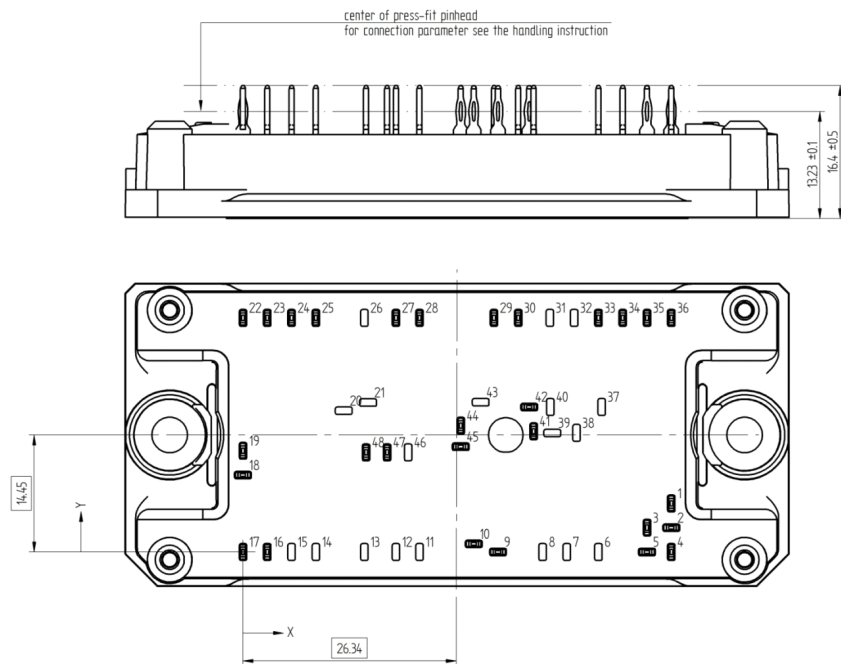


Ordering Code & Marking						
Version			Ordering Code			
without thermal paste 12 mm housing with press-fit pins			10-PG12NAC008MR02-LC69F36T			
with thermal paste 12 mm housing with press-fit pins			10-PG12NAC008MR02-LC69F36T-/3/			
NN-NNNNNNNNNNNN TTTTWW WWYY UL VIN LLLLL SSSS						
Text	Name		Date code	UL & VIN	Lot	Serial
	NN-NNNNNNNNNNNNNN-TTTTTWW		WWYY	UL VIN	LLLLL	SSSS
	Datamatrix	Type&Ver	Lot number	Serial	Date code	
	TTTTTWW	LLLLL	SSSS	WWYY		

Low Side Module 10-PG12NAC008MR02-LC69F36T

Outline

Pin table			
Pin	X	Y	Function
1	52,9	6	Ph2
2	52,9	3	Ph2
3	49,9	3	Ph2
4	52,9	0	Ph2
5	49,9	0	Ph2
6	Not assembled		
7	Not assembled		
8	Not assembled		
9	31,5	0	S14
10	28,5	1	G14
11	Not assembled		
12	Not assembled		
13	Not assembled		
14	Not assembled		
15	Not assembled		
16	3	0	Therm21
17	0	0	Therm22
18	0	9,5	S16
19	0	12,5	G16
20	Not assembled		
21	Not assembled		
22	0	28,9	DC+2
23	3	28,9	DC+2
24	6	28,9	DC+2
25	9	28,9	DC+2
26	Not assembled		
27	18,9	28,9	GND2
28	21,8	28,9	GND2
29	31	28,9	GND2
30	34	28,9	GND2
31	Not assembled		
32	Not assembled		
33	43,9	28,9	DC-2
34	46,9	28,9	DC-2
35	49,9	28,9	DC-2
36	52,9	28,9	DC-2
37	Not assembled		
38	Not assembled		
39	Not assembled		
40	Not assembled		
41	35,9	14,9	G12
42	35,35	17,9	S12
43	Not assembled		
44	26,9	15,6	N2
45	26,9	13	N2
46	Not assembled		
47	17,8	12,3	P2
48	15,2	12,3	P2

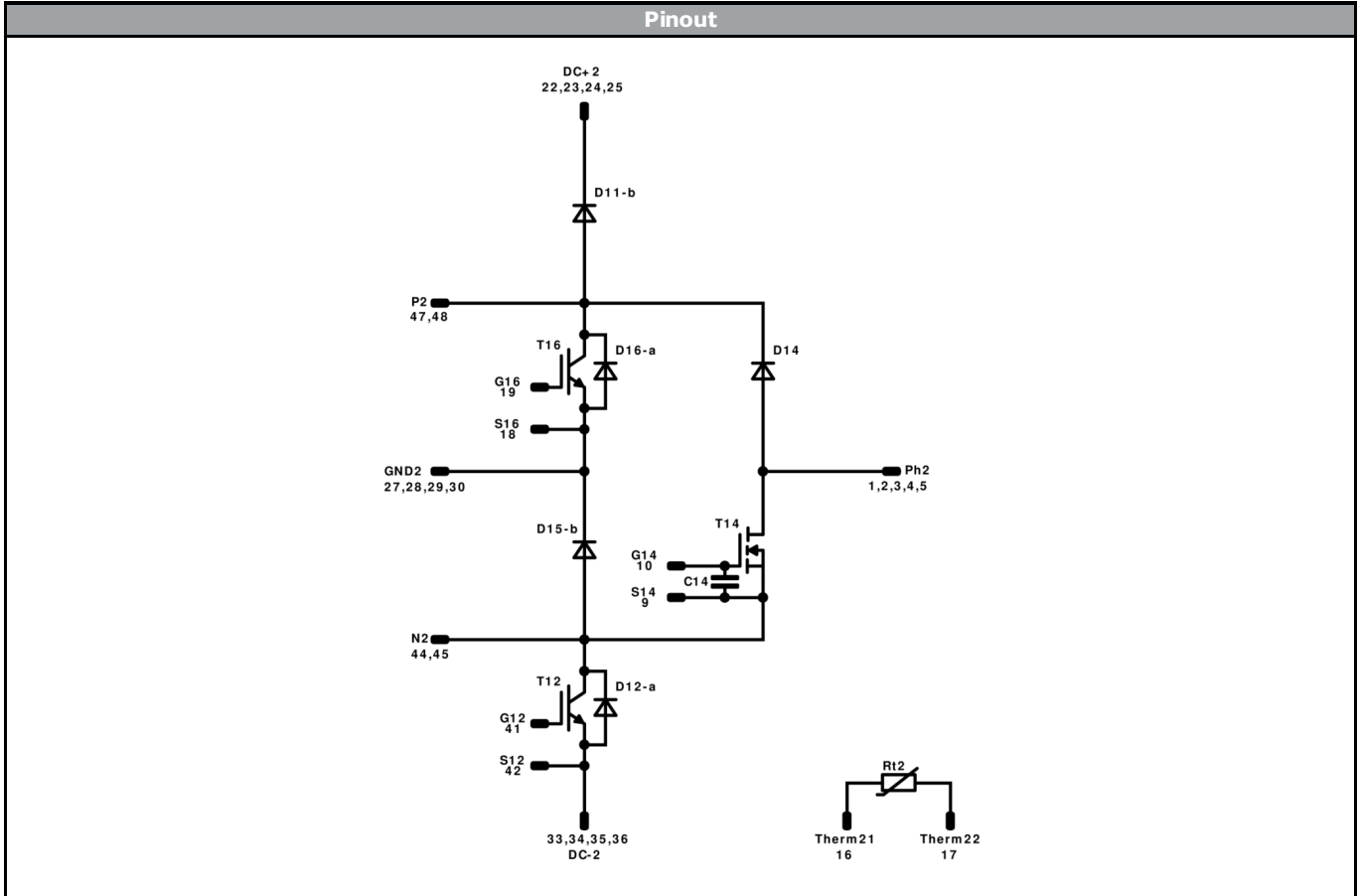


Tolerance of pinpositions: ±0.4mm at the end of pins
 Dimension of coordinate axis is only offset without tolerance



Low Side Module 10-PG12NAC008MR02-LC69F36T

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T14	MOSFET	1200 V	8 mΩ	AC Switch	
D14	FWD	1200 V	60 A	AC Diode	
T16	IGBT	1200 V	150 A	Neutral Point Switch	
D15-b	FWD	1200 V	150 A	Neutral Point Diode	
D16-a	FWD	1200 V	15 A	Neutral Point Switch Prot. Diode	
T12	IGBT	1200 V	150 A	DC-Link Switch	
D11-b	FWD	1200 V	100 A	DC-Link Diode	
D16-a	FWD	1200 V	100 A	DC-Link Switch Prot. Diode	
C14	Capacitor	25 V		Capacitor (GS)	
Rt2	NTC			Thermistor	




Vincotech

Packaging instruction			
Standard packaging quantity (SPQ) 100	>SPQ	Standard	<SPQ Sample

Handling instruction
Handling instructions for <i>flow 1</i> packages see vincotech.com website.

Package data
Package data for <i>flow 1</i> packages see vincotech.com website.

UL recognition and file number
This device is certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website. 

Document No.:	Date:	Modification:	Pages
10-PG12NAX008MR02-LCx9F36T-D2-14	17 May. 2019	Marketing application voltage modified Correction of I_c/I_f values	1 2,3

DISCLAIMER

The information, specifications, procedures, methods and recommendations herein (together "information") are presented by Vincotech to reader in good faith, are believed to be accurate and reliable, but may well be incomplete and/or not applicable to all conditions or situations that may exist or occur. Vincotech reserves the right to make any changes without further notice to any products to improve reliability, function or design. No representation, guarantee or warranty is made to reader as to the accuracy, reliability or completeness of said information or that the application or use of any of the same will avoid hazards, accidents, losses, damages or injury of any kind to persons or property or that the same will not infringe third parties rights or give desired results. It is reader's sole responsibility to test and determine the suitability of the information and the product for reader's intended use.

LIFE SUPPORT POLICY

Vincotech products are not authorised for use as critical components in life support devices or systems without the express written approval of Vincotech.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in labelling can be reasonably expected to result in significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.