Vincotech

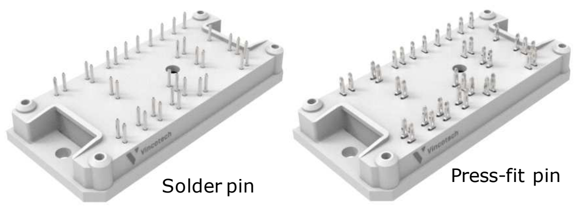
10-FY07BVA075S5-LF45E18 / 10-PY07BVA075S5-LF45E18Y datasheet

flow **SOL 1 BI (TL)** — **650 V / 75 A**

Features

- Dual Booster with bypass diode + H6.5 Bridge
- Trenchstop S5 IGBT Chipset for higher efficiency
- Kelvin emitter for improved switching
- Integrated DC Link capacitor
- Integrated NTC
- Low inductive design

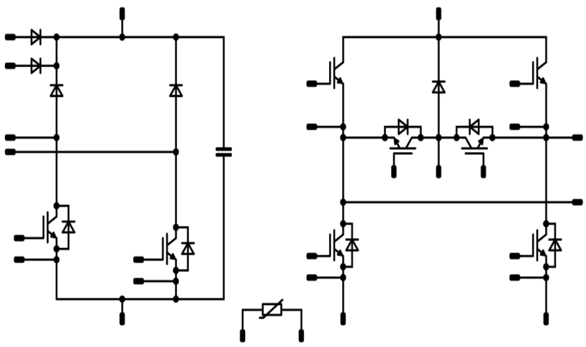
flow 1 12 mm housing



Target applications

- Solar Inverters

Schematic



Types

- 10-FY07BVA075S5-LF45E18
- 10-PY07BVA075S5-LF45E18Y

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Low Buck Switch / High Buck Switch					
Collector-emitter voltage	V_{CES}			650	V
Collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C	58	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		225	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	86	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Buck Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	47	A
Repetitive peak forward current	I_{FRM}			100	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	63	W
Maximum junction temperature	T_{jmax}			175	°C
Boost Switch					
Collector-emitter voltage	V_{CES}			650	V
Collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C	58	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		225	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	86	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C
Low Boost Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	47	A
Repetitive peak forward current	I_{FRM}			100	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	63	W
Maximum junction temperature	T_{jmax}			175	°C
High Boost Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	47	A
Repetitive peak forward current	I_{FRM}			100	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	63	W
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Input Boost Switch					
Collector-emitter voltage	V_{CES}			650	V
Collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C	58	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		225	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	86	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C
Input Boost Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	55	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	71	W
Maximum junction temperature	T_{jmax}			175	°C
ByPass Diode					
Peak repetitive reverse voltage	V_{RRM}			1600	V
Continuous (direct) forward current	I_F			75	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	95	W
Maximum junction temperature	T_{jmax}			150	°C
Input Boost Sw. Protection Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F			10	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	33	W
Maximum junction temperature	T_{jmax}			175	°C
Capacitor (DC)					
Maximum DC voltage	V_{MAX}			630	V
Operation Temperature	T_{op}			-55…+125	°C

Maximum Ratings

T_j = 25 °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_{jop}			-40…(T_{jmax} - 25)	°C
Isolation Properties					
Isolation voltage	V_{isol}	DC Test Voltage*	t_p = 2 s	6000	V
		AC Voltage	t_p = 1 min	2500	V
Creepage distance				min. 12,7	mm
Clearance		Solder pins / Press-fit pins		8,16 / 7,93	mm
Comparative Tracking Index	CTI			> 200	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Low Buck Switch / High Buck Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,00075	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		75	25 125 150		1,56 1,56 1,59	1,75	V
Collector-emitter cut-off current	I_{CES}		0	650		25			50	µA
Gate-emitter leakage current	I_{GES}		20	0		25			100	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f= 1 Mhz	0	25		25		4500		pF
Output capacitance	C_{oes}							130		
Reverse transfer capacitance	C_{res}							17		
Gate charge	Q_g		15	520	75	25		164		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,10		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	-5 / 15	350	75	25 125 150		31 31 31		ns
Rise time	t_r					25 125 150		10 10 11		
Turn-off delay time	$t_{d(off)}$					25 125 150		110 126 132		
Fall time	t_f					25 125 150		10 25 32		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 2,2 µC Q_{rFWD} = 4 µC Q_{rFWD} = 4,7 µC				25 125 150		0,450 0,701 0,758		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,457 0,875 1,02		

Characteristic Values

Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Buck Diode										
Static										
Forward voltage	V_F				50	25 125 150		1,50 1,44 1,42	1,92	V
Reverse leakage current	I_R			650		25			2,65	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,50		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 5329 A/µs di/dt = 8023 A/µs di/dt = 7260 A/µs	-5 / 15	350	75	25 125 150		86 110 117		A
Reverse recovery time	t_{rr}					25 125 150		55 87 101		ns
Recovered charge	Q_r					25 125 150		2,18 4,04 4,70		µC
Reverse recovered energy	E_{rec}					25 125 150		0,381 0,839 1,02		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		5984 4040 4174		A/µs

Characteristic Values

Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,00075	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		75	25 125 150		1,56 1,56 1,59	1,75	V
Collector-emitter cut-off current	I_{CES}		0	650		25			50	µA
Gate-emitter leakage current	I_{GES}		20	0		25			100	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f= 1 Mhz	0	25		25		4500		pF
Output capacitance	C_{oes}							130		
Reverse transfer capacitance	C_{res}							17		
Gate charge	Q_g		15	520	75	25		164		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,10		K/W
Dynamic (T21,D12)										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 4 Ω R_{gon} = 4 Ω	±15	350	76	25 125 150		60 62 60		ns
Rise time	t_r					25 125 150		11 10 11		
Turn-off delay time	$t_{d(off)}$					25 125 150		88 106 109		
Fall time	t_f					25 125 150		12 17 22		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 2,2 µC Q_{rFWD} = 4,1 µC Q_{rFWD} = 4,7 µC				25 125 150		0,661 0,904 0,986		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,604 1,04 1,11		

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Low Boost Diode										
Static										
Forward voltage	V_F				50	25 125 150		1,50 1,44 1,42	1,92	V
Reverse leakage current	I_R			650		25			2,65	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,50		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 6510 A/µs di/dt = 4900 A/µs di/dt = 6125 A/µs	±15	350	76	25 125 150		83 93 94		A
Reverse recovery time	t_{rr}					25 125 150		59 100 117		ns
Recovered charge	Q_r					25 125 150		2,18 4,08 4,73		µC
Reverse recovered energy	E_{rec}					25 125 150		0,470 0,935 1,10		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		5969 1181 1324		A/µs

Characteristic Values

Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,00075	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		75	25 125 150		1,56 1,56 1,59	1,75	V
Collector-emitter cut-off current	I_{CES}		0	650		25			50	µA
Gate-emitter leakage current	I_{GES}		20	0		25			100	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	25		25		4500		pF
Output capacitance	C_{oes}							130		
Reverse transfer capacitance	C_{res}							17		
Gate charge	Q_g		15	520	75	25		164		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,10		K/W
Dynamic (T21,D20)										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 4 Ω R_{gon} = 4 Ω	±15	350	76	25 125 150		65 64 66		ns
Rise time	t_r					25 125 150		12 11 13		
Turn-off delay time	$t_{d(off)}$					25 125 150		87 105 110		
Fall time	t_f					25 125 150		14 21 31		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 2,1 µC Q_{rFWD} = 4 µC Q_{rFWD} = 4,5 µC				25 125 150		0,527 0,873 0,855		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,733 1,04 1,29		

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
High Boost Diode										
Static										
Forward voltage	V_F				50	25 125 150		1,50 1,44 1,42	1,92	V
Reverse leakage current	I_R			650		25			2,65	μA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,50		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 6622 A/μs di/dt = 6272 A/μs di/dt = 6687 A/μs	±15	350	76	25 125 150		71 92 92		A
Reverse recovery time	t_{rr}					25 125 150		57 105 113		ns
Recovered charge	Q_r					25 125 150		2,14 4,02 4,51		μC
Reverse recovered energy	E_{rec}					25 125 150		0,629 1,05 1,27		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		1089 1422 1342		A/μs

Characteristic Values

Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Value Min	Value Typ	Value Max	Unit
Input Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,00075	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		75	25 125 150		1,56 1,56 1,59	1,75	V
Collector-emitter cut-off current	I_{CES}		0	650		25			50	µA
Gate-emitter leakage current	I_{GES}		20	0		25			100	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f= 1 Mhz	0	25		25		4500		pF
Output capacitance	C_{oes}	f= 1 Mhz	0	25		25		130		pF
Reverse transfer capacitance	C_{res}	f= 1 Mhz	0	25		25		17		pF
Gate charge	Q_g		15	520	75	25		164		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,10		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	0 / 15	350	75	25 125 150		24 24 24		ns
Rise time	t_r	R_{gon} = 4 Ω R_{goff} = 4 Ω	0 / 15	350	75	25 125 150		11 12 12		ns
Turn-off delay time	$t_{d(off)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	0 / 15	350	75	25 125 150		127 145 150		ns
Fall time	t_f	R_{gon} = 4 Ω R_{goff} = 4 Ω	0 / 15	350	75	25 125 150		22 30 36		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 2,5 µC Q_{rFWD} = 4,7 µC Q_{rFWD} = 5,4 µC	0 / 15	350	75	25 125 150		0,379 0,605 0,681		mWs
Turn-off energy (per pulse)	E_{off}		0 / 15	350	75	25 125 150		0,854 1,24 1,36		mWs

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Input Boost Diode										
Static										
Forward voltage	V_F				75	25 125 150		1,53 1,49 1,47	1,92	V
Reverse leakage current	I_R			650		25			3,8	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,34		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 8536 A/µs di/dt = 6881 A/µs di/dt = 6458 A/µs	0 / 15	350	75	25 125 150		92 116 123		A
Reverse recovery time	t_{rr}					25 125 150		53 84 94		ns
Recovered charge	Q_r					25 125 150		2,49 4,66 5,38		µC
Reverse recovered energy	E_{rec}					25 125 150		0,672 1,27 1,46		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		2911 2634 2713		A/µs
ByPass Diode										
Static										
Forward voltage	V_F				75	25 125		1,10 1,04		V
Reverse leakage current	I_R			1600		25			50	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,74		K/W

Characteristic Values

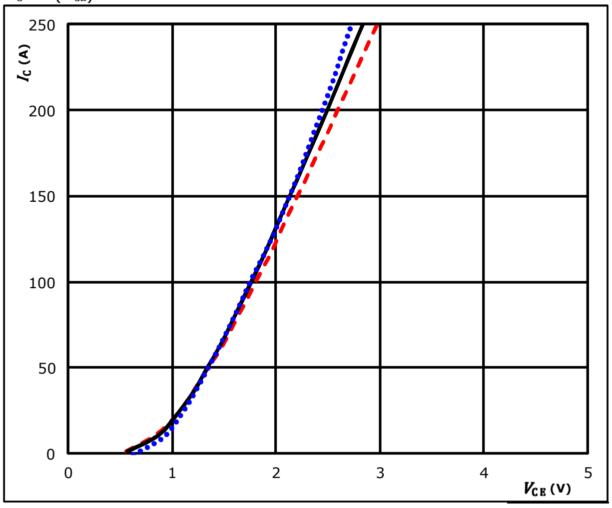
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Input Boost Sw. Protection Diode										
Static										
Forward voltage	V_F				10	25 125		1,67 1,56	1,87	V
Reverse leakage current	I_R			650		25			0,14	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						2,87		K/W
Capacitor (DC)										
Capacitance	C							100		nF
Tolerance							-10		+10	%
Dissipation factor									2,5	%
Thermistor										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P					25		5		mW
Power dissipation constant						25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. ±1 %				25		3962		K
B-value	$B_{(25/100)}$	Tol. ±1 %				25		4000		K
Vincotech NTC Reference									I	

Low Buck Switch / High Buck Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

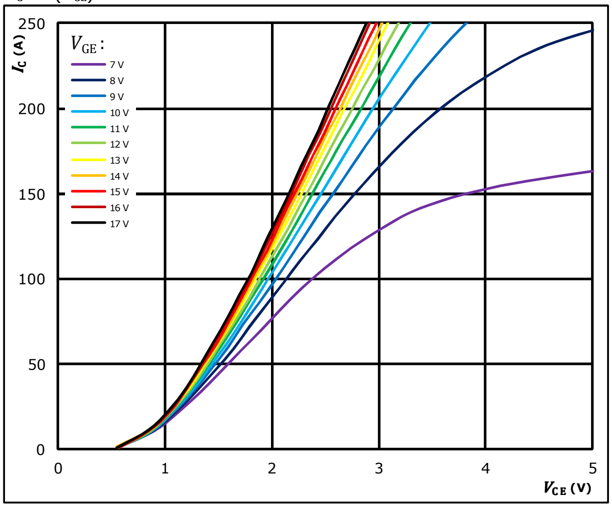


t_p = 250 µs
V_{GE} = 15 V
T_j: 25 °C (dotted), 125 °C (solid), 150 °C (dashed)

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

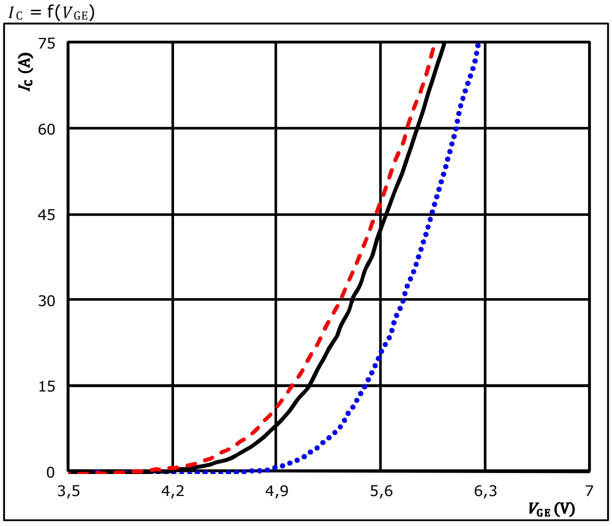


t_p = 250 µs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

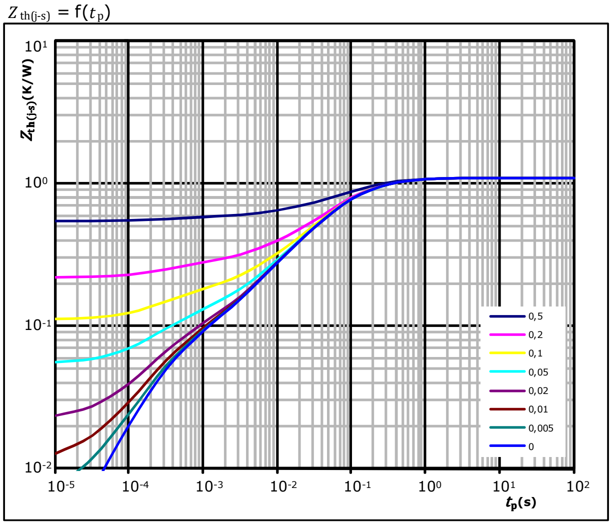


t_p = 100 µs
V_{CE} = 10 V
T_j: 25 °C (dotted), 125 °C (solid), 150 °C (dashed)

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T
$R_{th(j\text{-}s)}$ = 1,10 K/W

IGBT thermal model values

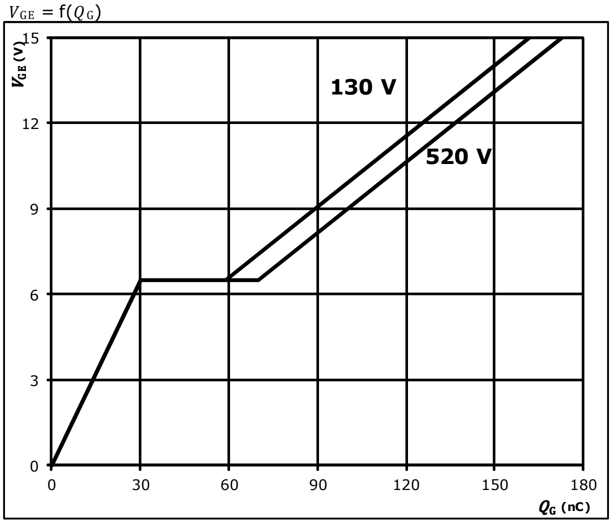
R (K/W)	τ (s)
2,16E-01	4,05E-01
6,30E-01	6,87E-02
1,62E-01	1,13E-02
3,68E-02	2,51E-03
6,02E-02	3,09E-04

Low Buck Switch / High Buck Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

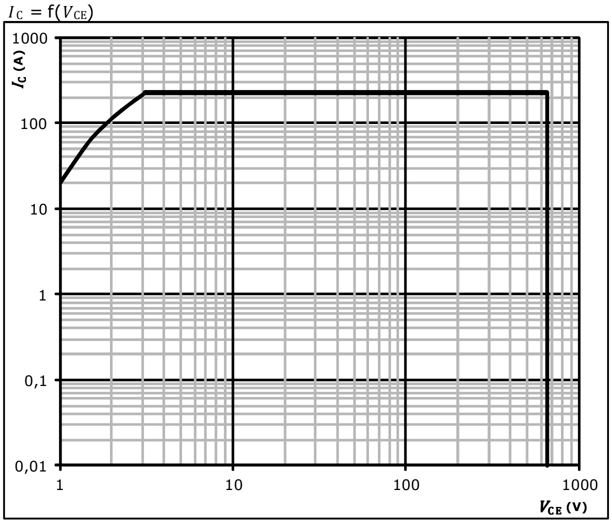


I_C= 75 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



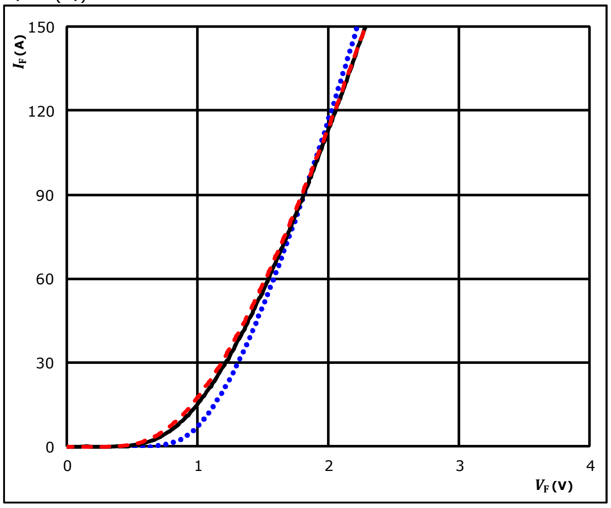
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Buck Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



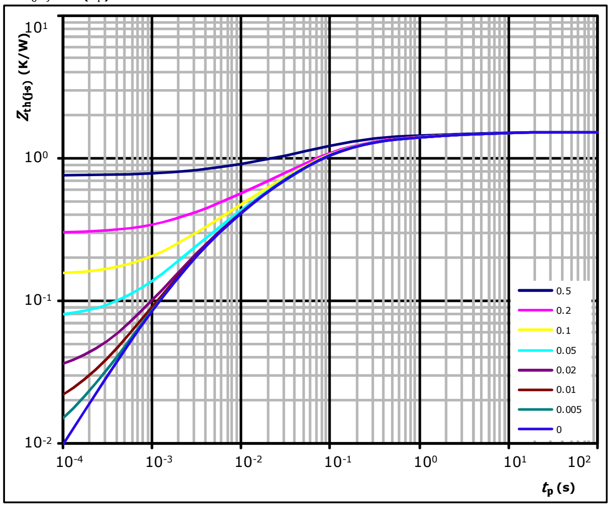
t_p = 250 µs

T_j:
25 °C
125 °C
150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 1,50 K/W

FWD thermal model values

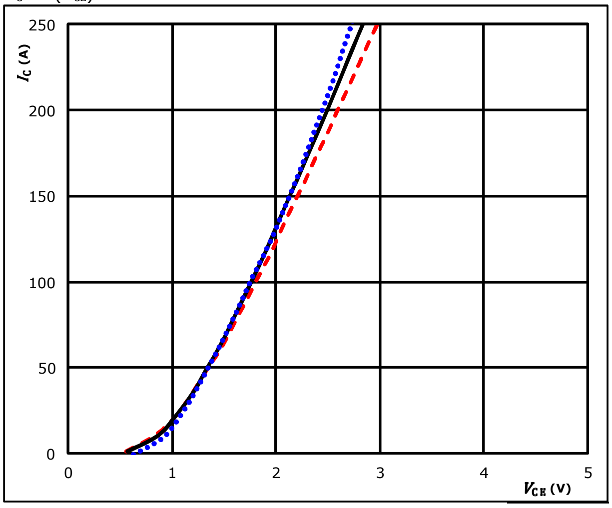
R (K/W)	τ (s)
1,03E-01	4,73E+00
2,05E-01	5,53E-01
6,39E-01	8,31E-02
3,39E-01	2,02E-02
1,71E-01	4,42E-03
4,45E-02	1,30E-03

Boost Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

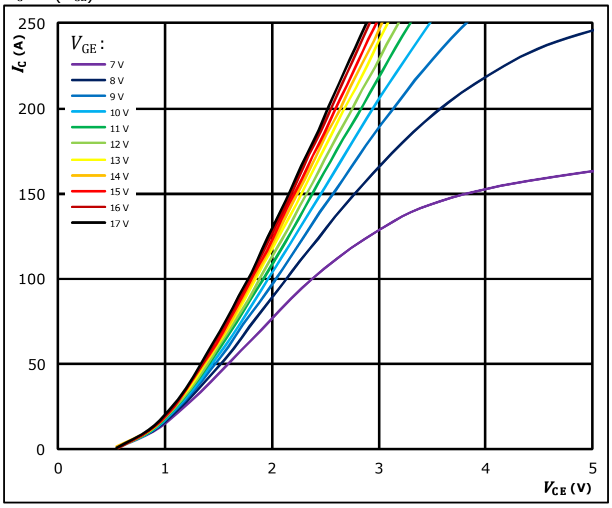


t_p =	250	μs		25 °C	dotted
V_{GE} =	15	V	T_j:	125 °C	solid
				150 °C	dashed

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



t_p = 250 μs

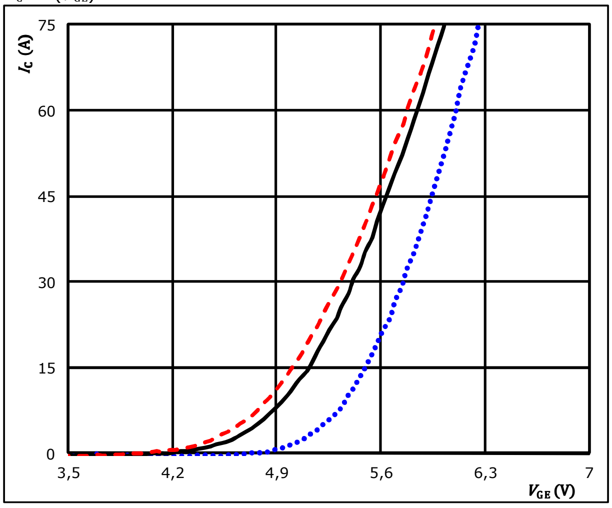
T_j = 150 °C

V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

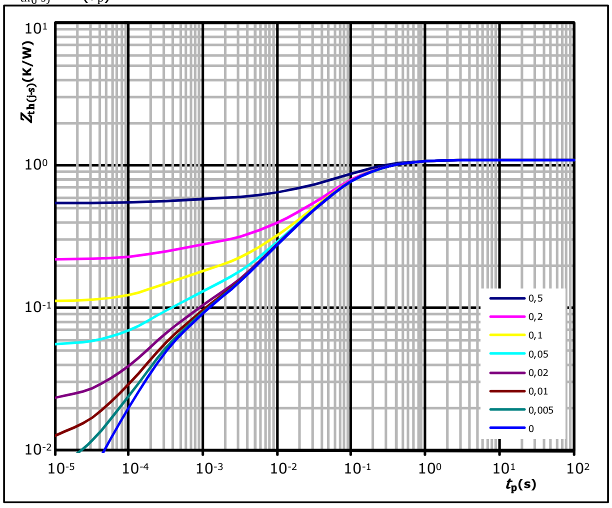


t_p =	100	μs		25 °C	dotted
V_{CE} =	10	V	T_j:	125 °C	solid
				150 °C	dashed

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T

$R_{th(j-s)}$ = 1,10 K/W

IGBT thermal model values

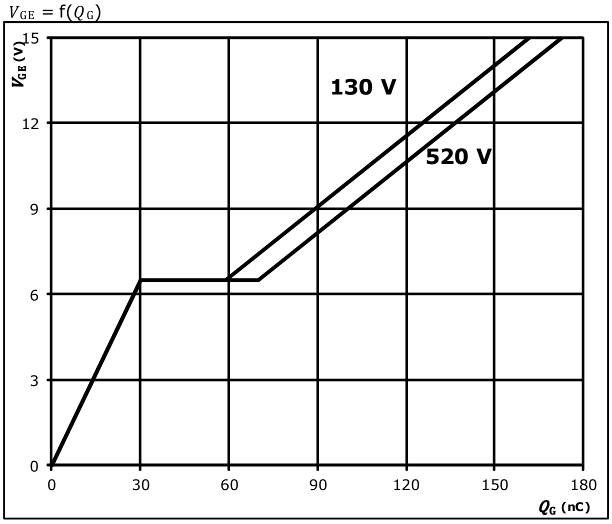
R (K/W)	τ (s)
2,16E-01	4,05E-01
6,30E-01	6,87E-02
1,62E-01	1,13E-02
3,68E-02	2,51E-03
6,02E-02	3,09E-04

Boost Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

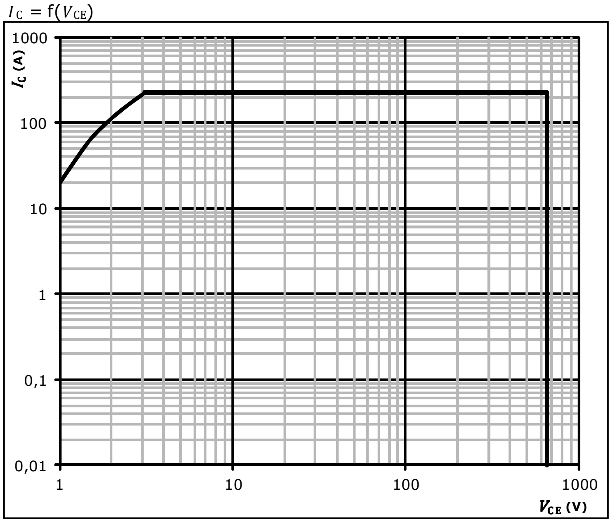


I_C= 75 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



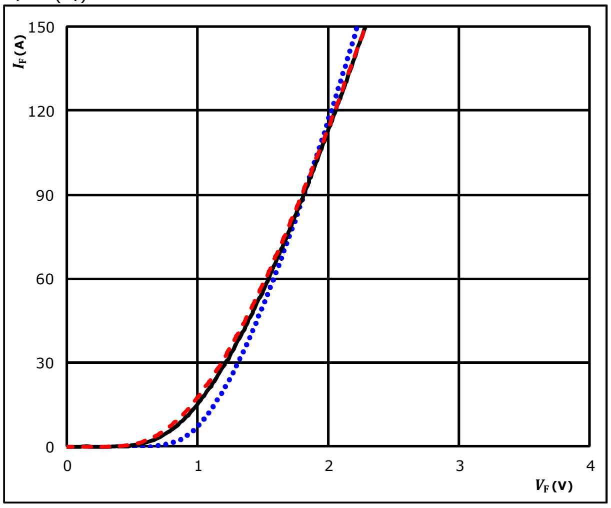
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Low Boost Diode Characteristics

figure 1. FWD

Typical forward characteristics

$I_F = f(V_F)$



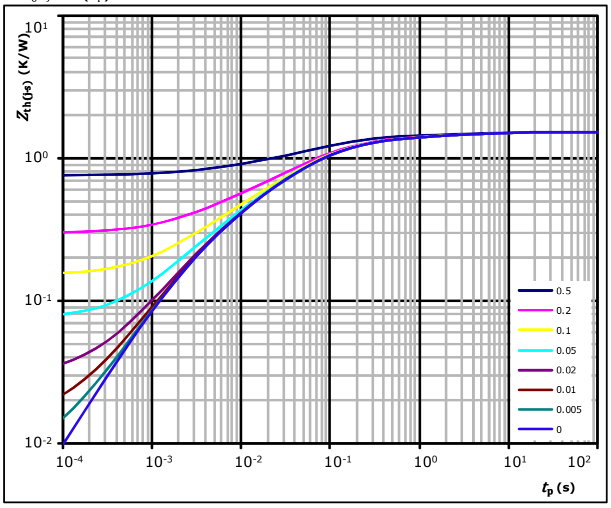
t_p = 250 μs

T_j: 25 °C; 125 °C; 150 °C

figure 2. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 1,50 K/W

FWD thermal model values

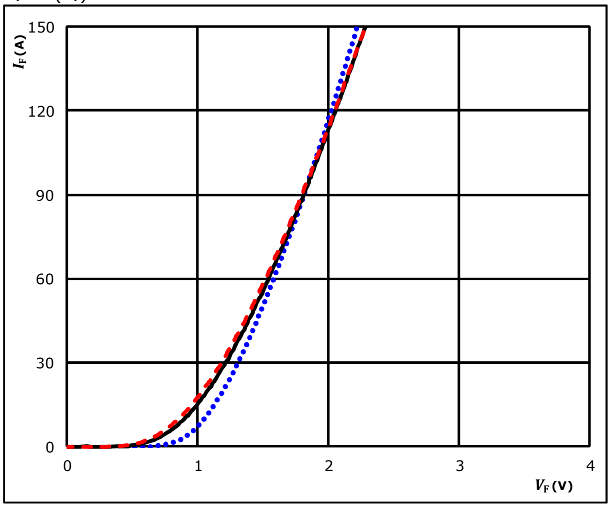
R (K/W)	τ (s)
1,03E-01	4,73E+00
2,05E-01	5,53E-01
6,39E-01	8,31E-02
3,39E-01	2,02E-02
1,71E-01	4,42E-03
4,45E-02	1,30E-03

High Boost Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



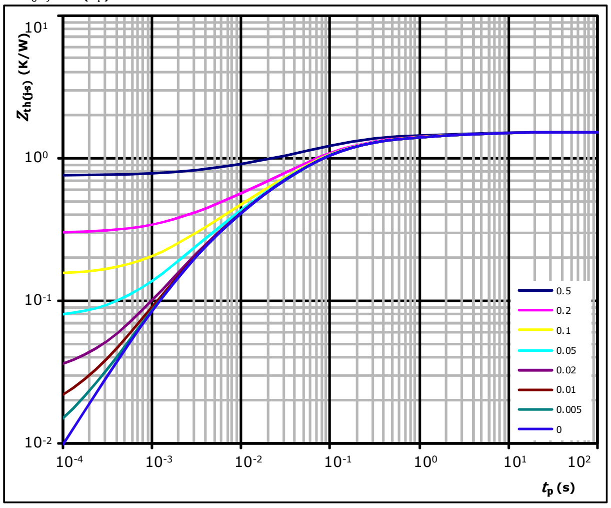
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 1,50 K/W

FWD thermal model values

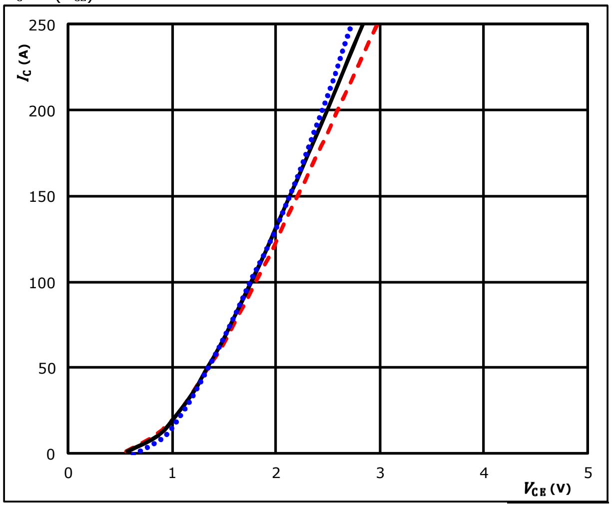
R (K/W)	τ (s)
1,03E-01	4,73E+00
2,05E-01	5,53E-01
6,39E-01	8,31E-02
3,39E-01	2,02E-02
1,71E-01	4,42E-03
4,45E-02	1,30E-03

Input Boost Switch Characteristics

figure 1. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

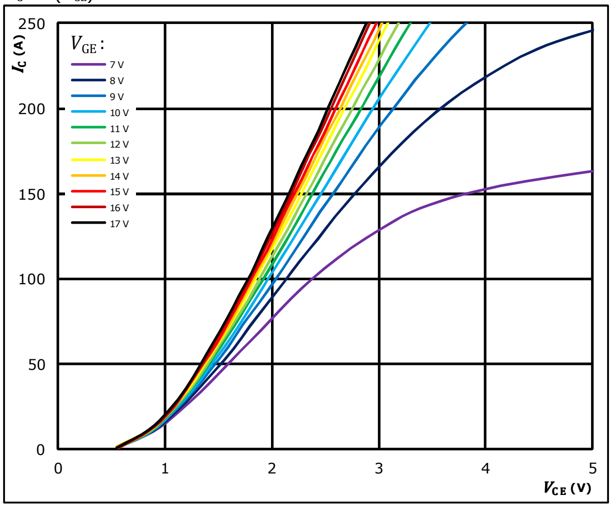


t_p =	250	µs	T_j:	25 °C
V_{GE} =	15	V		125 °C
				150 °C

figure 2. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

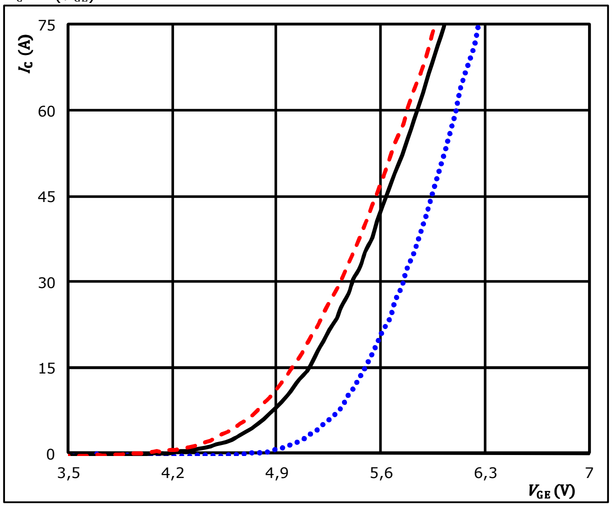


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$

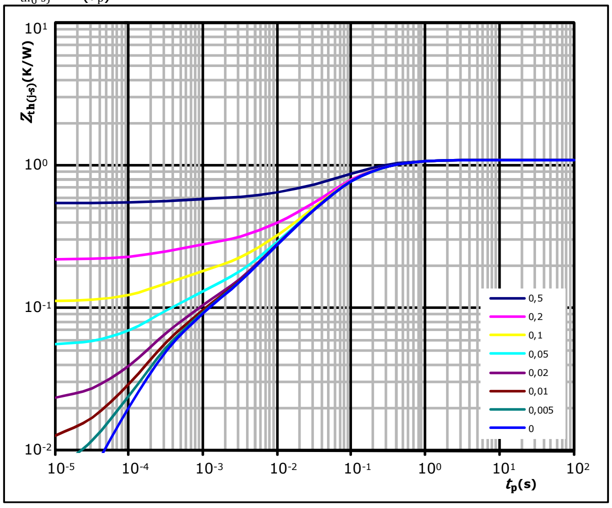


t_p =	100	µs	T_j:	25 °C
V_{CE} =	10	V		125 °C
				150 °C

figure 4. IGBT

Transient thermal impedance as function of pulse duration

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 1,10 K/W

IGBT thermal model values

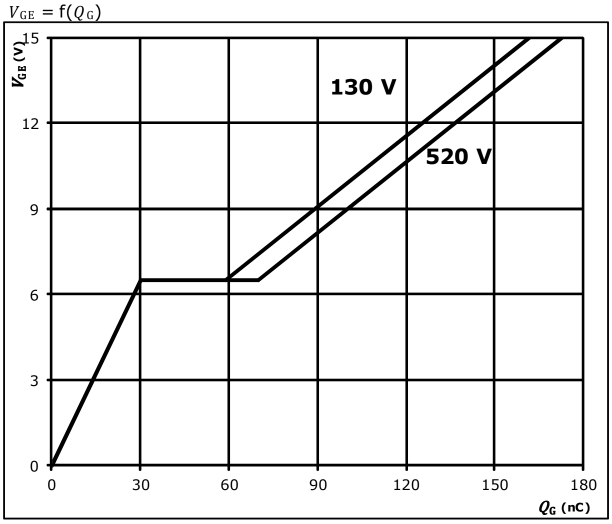
R (K/W)	τ (s)
2,16E-01	4,05E-01
6,30E-01	6,87E-02
1,62E-01	1,13E-02
3,68E-02	2,51E-03
6,02E-02	3,09E-04

Input Boost Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

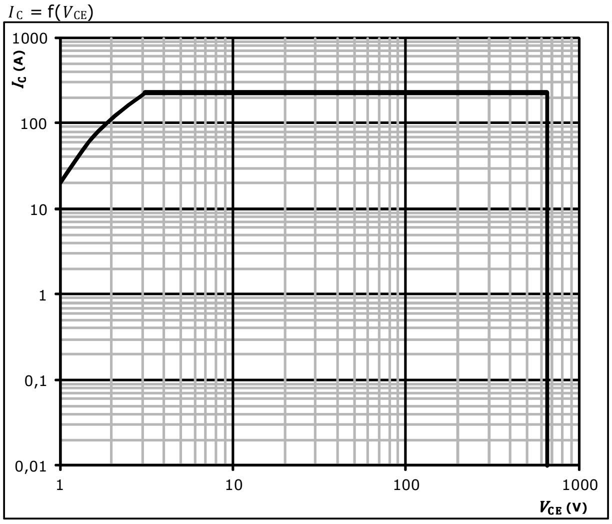


I_C = 75 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



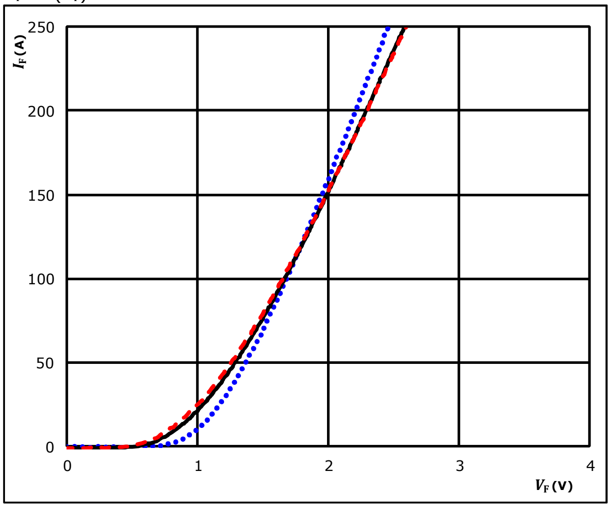
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Input Boost Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



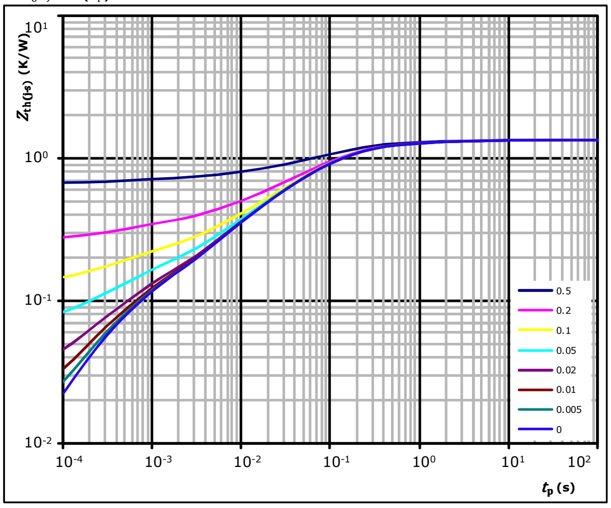
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 1,34 K/W

FWD thermal model values

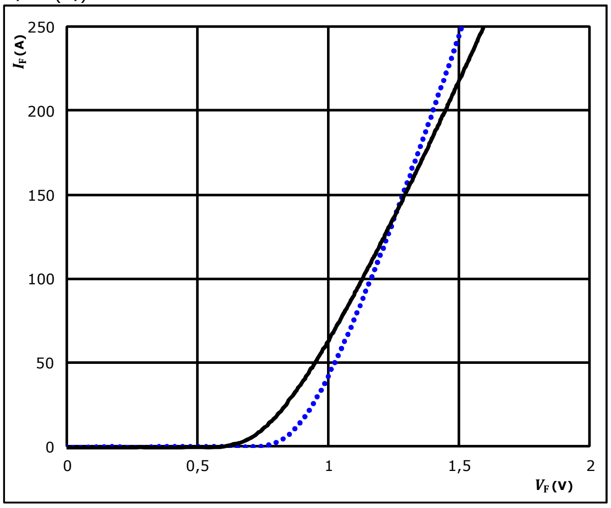
R (K/W)	τ (s)
5,84E-02	3,64E+00
1,57E-01	5,25E-01
5,86E-01	1,06E-01
3,27E-01	2,57E-02
1,27E-01	4,84E-03
8,12E-02	4,11E-04

ByPass Diode Characteristics

figure 1. **Bypass diode**

Typical forward characteristics

$I_F = f(V_F)$



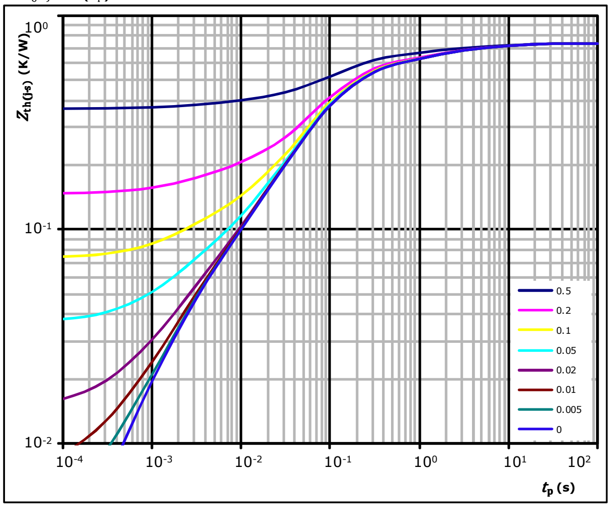
t_p = 250 µs

T_j: 25 °C (dotted); 125 °C (solid)

figure 2. **Bypass diode**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j\text{-}s)}$ = 0,74 K/W

Diode thermal model values

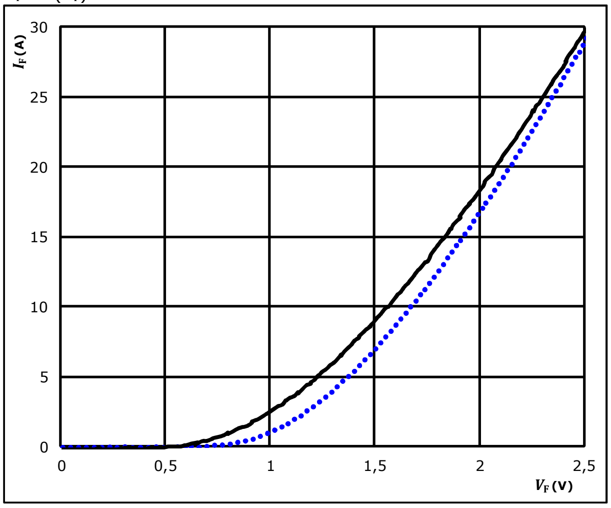
R (K/W)	τ (s)
6,95E-02	7,08E+00
1,21E-01	1,15E+00
2,75E-01	1,52E-01
2,24E-01	5,48E-02
3,60E-02	4,07E-03
1,01E-02	1,33E-03

Input Boost Sw. Protection Diode Characteristics

figure 1. **Prot. Diode**

Typical forward characteristics

$I_F = f(V_F)$



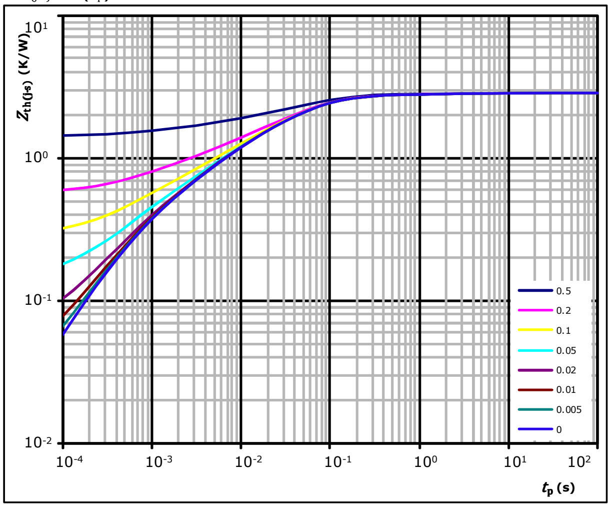
t_p = 250 μs

T_j: 25 °C (dotted); 125 °C (solid)

figure 2. **Prot. Diode**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 2,87 K/W

Prot. Diode thermal model values

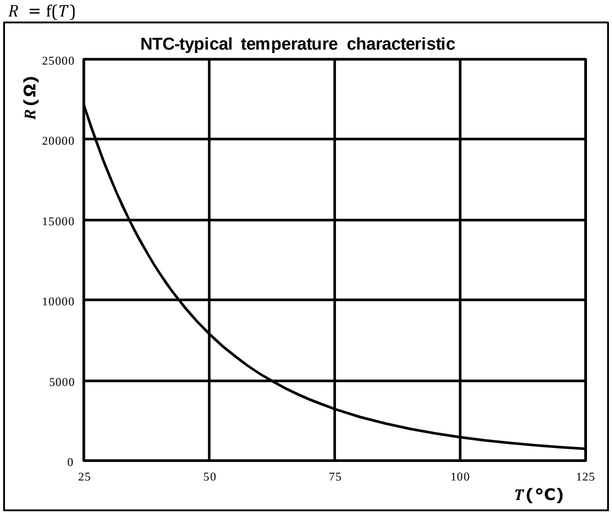
R (K/W)	τ (s)
6,53E-02	3,94E+00
1,48E-01	4,48E-01
1,31E+00	5,96E-02
7,32E-01	1,36E-02
4,04E-01	2,79E-03
2,11E-01	5,37E-04

Thermistor Characteristics

figure 1. **Thermistor**

Typical NTC characteristic as a function of temperature

$R = f(T)$

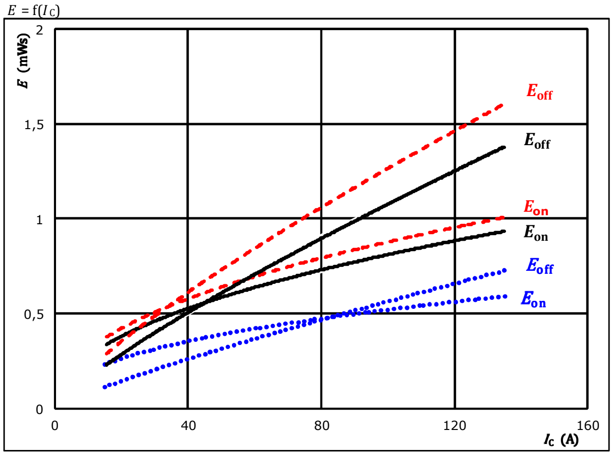


Buck Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



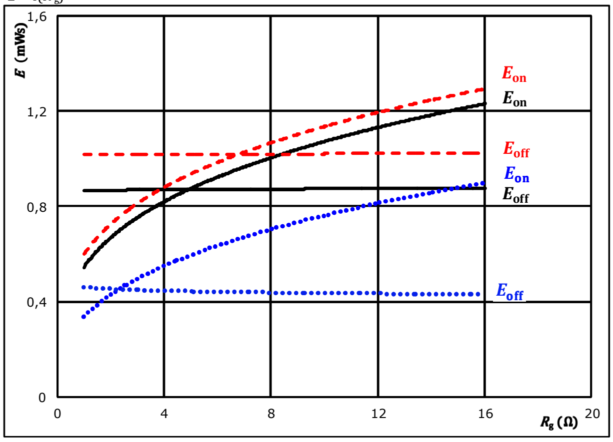
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	dotted (blue)
V_{GE} =	-5 / 15	V		125 °C	solid (black)
R_{gon} =	4	Ω		150 °C	dashed (red)
R_{goff} =	4	Ω			

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



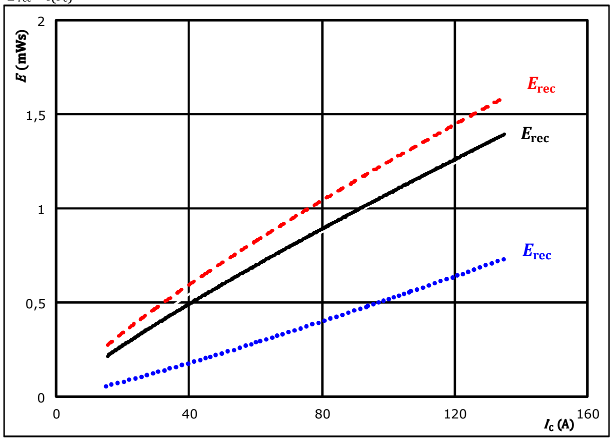
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	dotted (blue)
V_{GE} =	-5 / 15	V		125 °C	solid (black)
I_C =	75	A		150 °C	dashed (red)

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



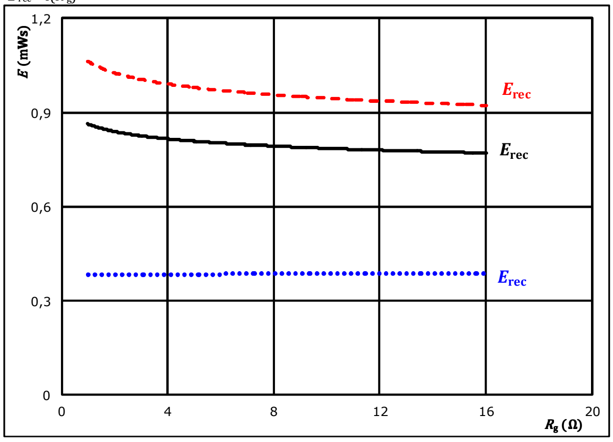
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	dotted (blue)
V_{GE} =	-5 / 15	V		125 °C	solid (black)
R_{gon} =	4	Ω		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

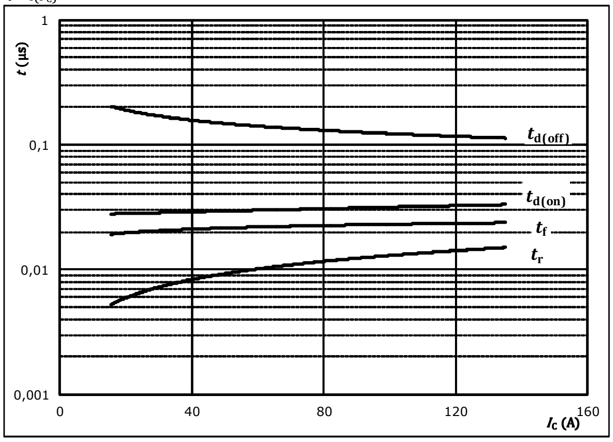
V_{CE} =	350	V	T_j:	25 °C	dotted (blue)
V_{GE} =	-5 / 15	V		125 °C	solid (black)
I_C =	75	A		150 °C	dashed (red)

Buck Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



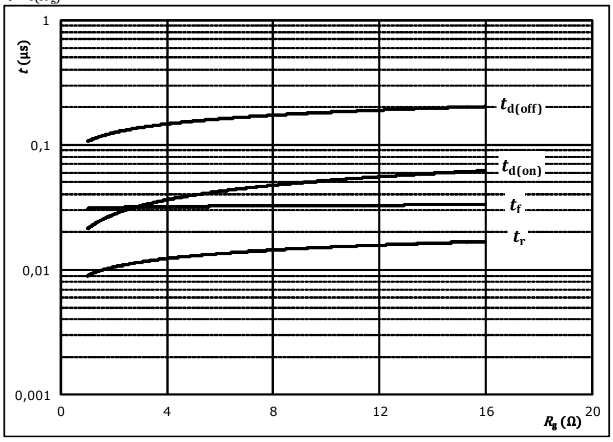
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	-5 / 15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



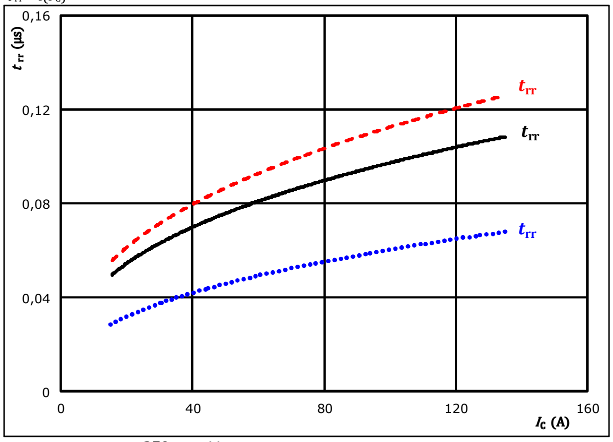
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	-5 / 15	V
I_C =	75	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

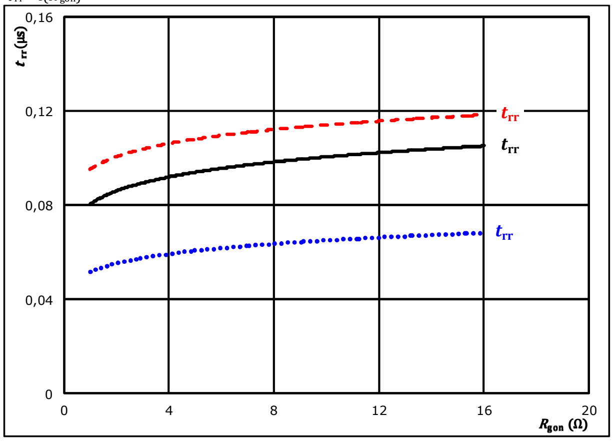


At					
V_{CE} =	350	V		25 °C	···········
V_{GE} =	-5 / 15	V	T_j:	125 °C	———
R_{gon} =	4	Ω		150 °C	— — —

figure 8. **FWD**

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

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



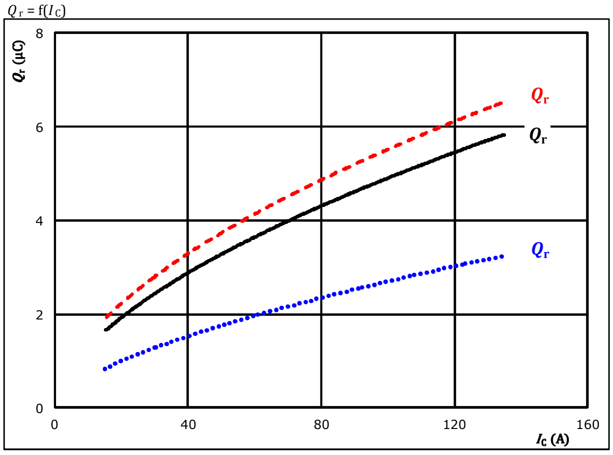
At					
V_{CE} =	350	V		25 °C	···········
V_{GE} =	-5 / 15	V	T_j:	125 °C	———
I_C =	75	A		150 °C	— — —

Buck Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

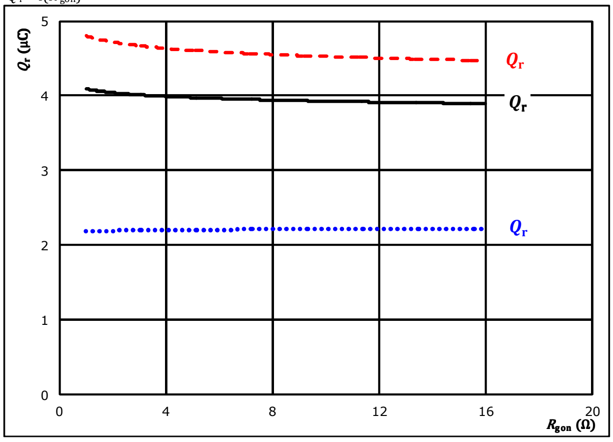


At						
V_{CE} =	350	V	T_j:	25 °C		···········
V_{GE} =	-5 / 15	V		125 °C		———
R_{gon} =	4	Ω		150 °C		– – –

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

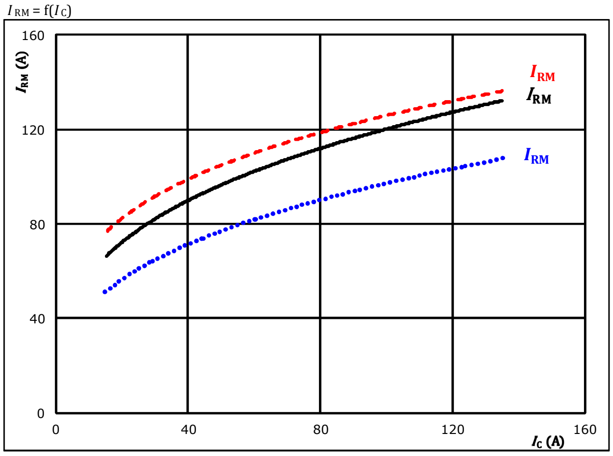


At						
V_{CE}=	350	V	T_j:	25 °C		···········
V_{GE} =	-5 / 15	V		125 °C		———
I_C=	75	A		150 °C		– – –

figure 11. **FWD**

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

$I_{RM} = f(I_C)$

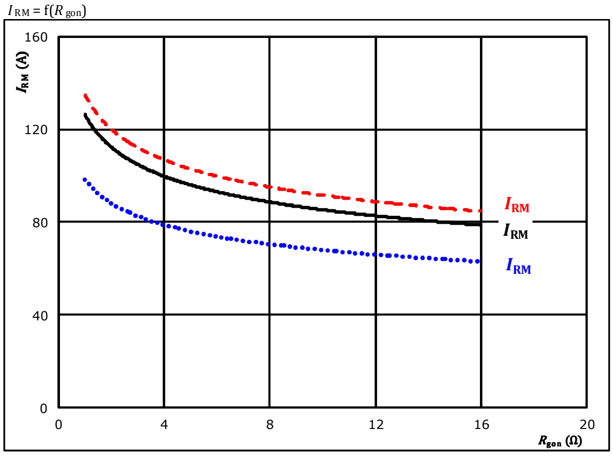


At						
V_{CE}:	350	V	T_j:	25 °C		···········
V_{GE} =	-5 / 15	V		125 °C		———
R_{gon} =	4	Ω		150 °C		– – –

figure 12. **FWD**

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

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



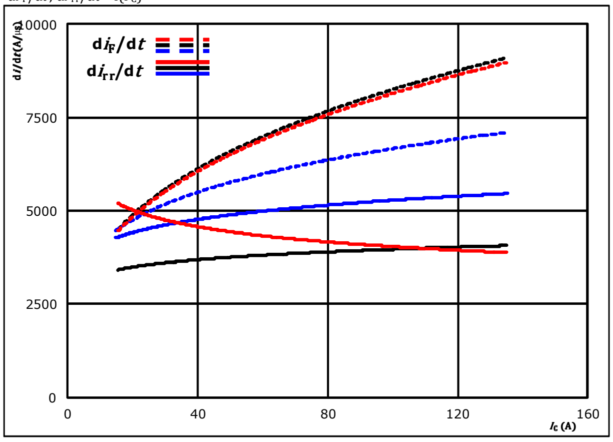
At						
V_{CE} =	350	V	T_j:	25 °C		···········
V_{GE} =	-5 / 15	V		125 °C		———
I_C =	75	A		150 °C		– – –

Buck Switching Characteristics

figure 13. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of collector current

di_F/dt, $di_{rr}/dt = f(I_C)$

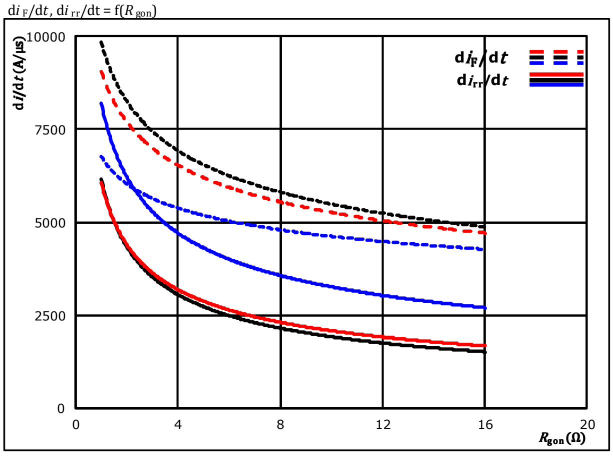


At					
V_{CE} =	350	V		25	°C
V_{GE} =	-5 / 15	V	T_j:	125	°C
R_{gon} =	4	Ω		150	°C

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, $di_{rr}/dt = f(R_{gon})$



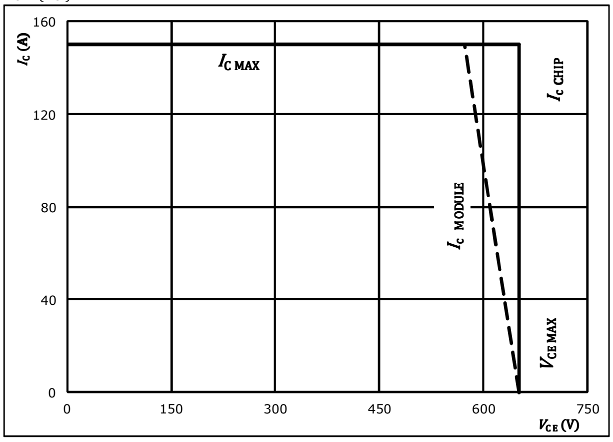
At					
V_{CE} =	350	V		25	°C
V_{GE} =	-5 / 15	V	T_j:	125	°C
I_C=	75	A		150	°C

Buck Switching Characteristics

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At		
T_j =	175	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

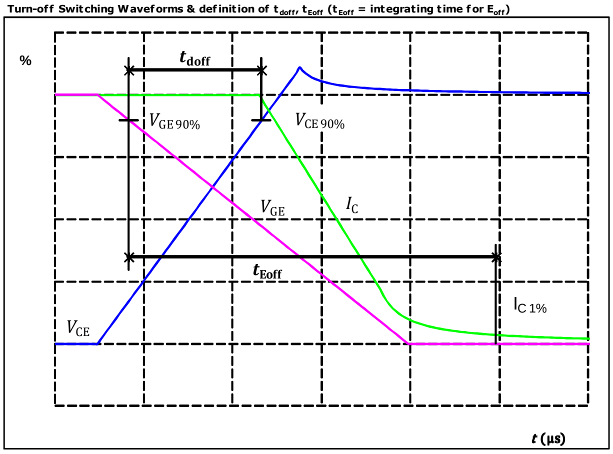
Buck Switching Definitions

General conditions

T_j	=	125 °C
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

figure 1. IGBT

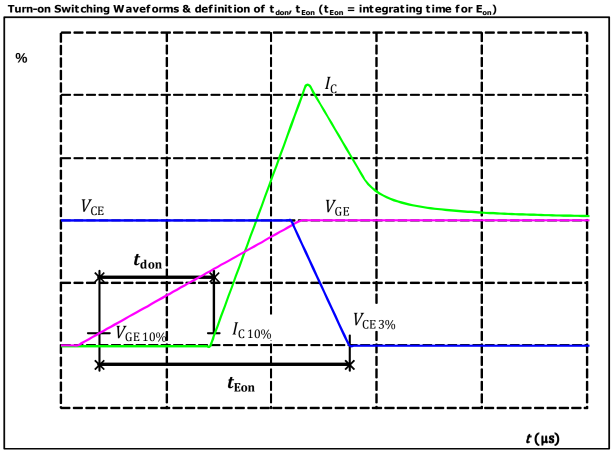
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-5	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	75	A
t_{doff} =	126	ns

figure 2. IGBT

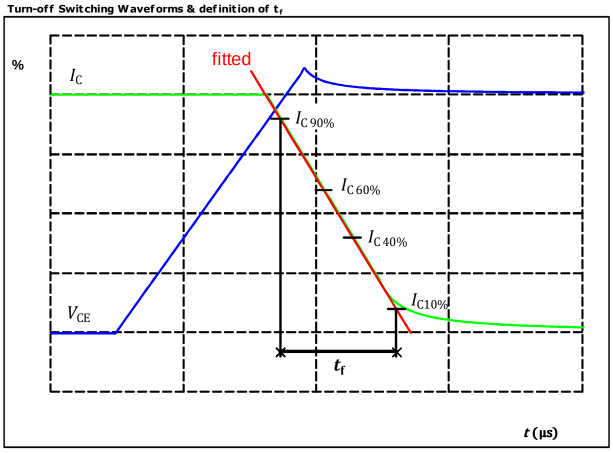
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-5	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	75	A
t_{don} =	31	ns

figure 3. IGBT

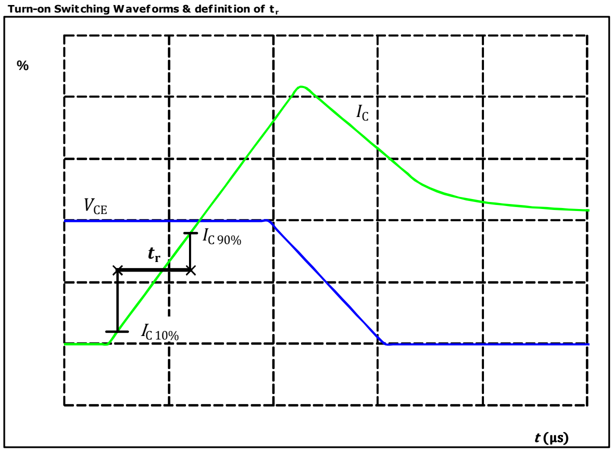
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	75	A
t_f =	25	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

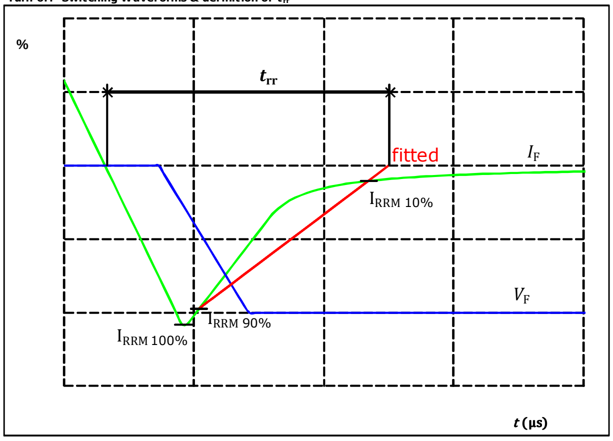


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	75	A
t_r =	10	ns

Buck Switching Characteristics

figure 5. **FWD**

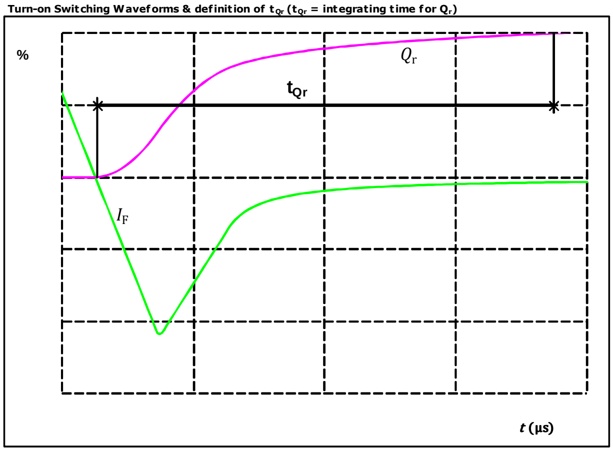
Turn-off Switching Waveforms & definition of t_{rr}



V_F (100%) =	350	V
I_F (100%) =	75	A
I_{RRM} (100%) =	110	A
t_{rr} =	87	ns

figure 6. **FWD**

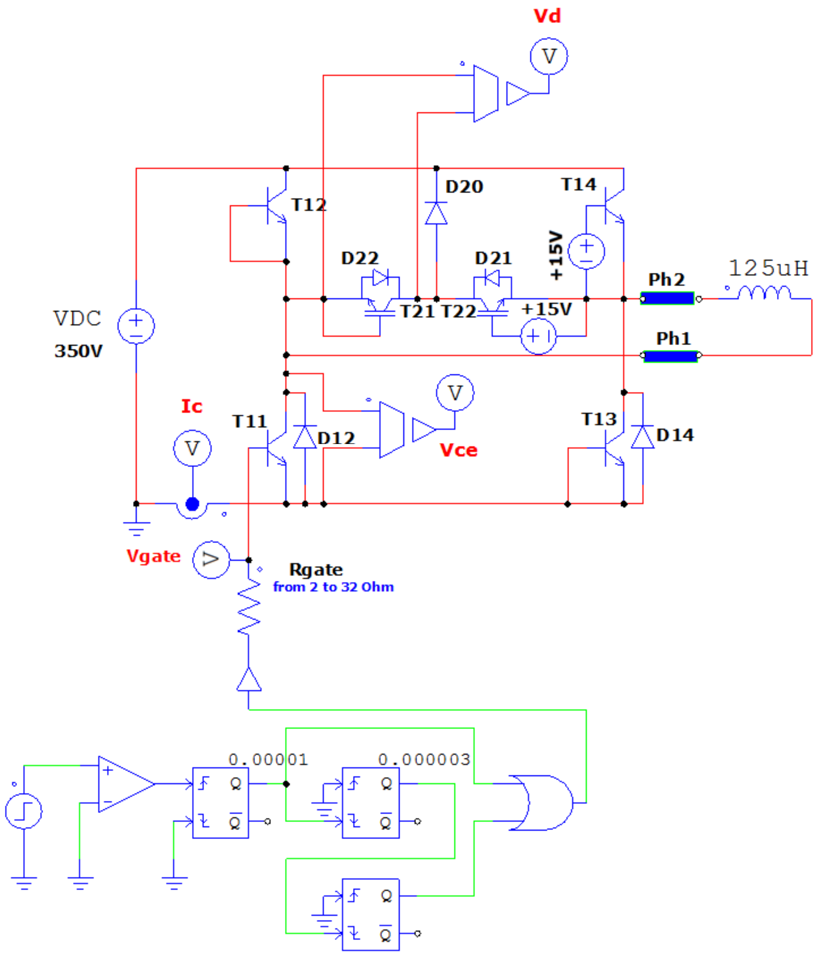
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	75	A
Q_r (100%) =	4,04	µC

Buck Switching measurement circuit

figure 1.

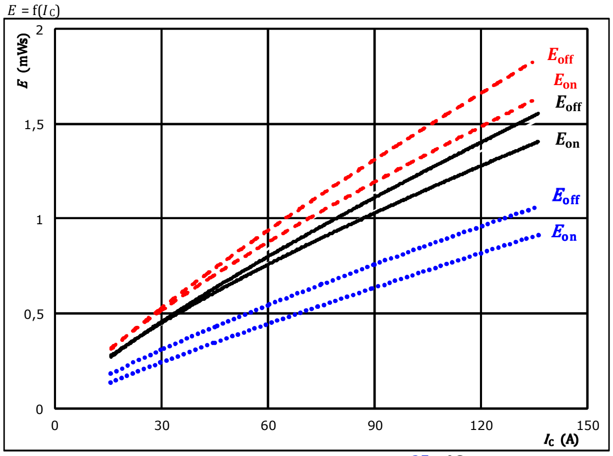


Low Boost Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



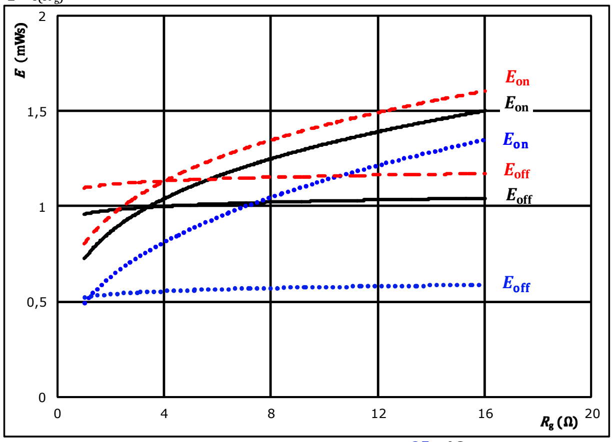
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	dotted (blue)
V_{GE} =	±15	V		125 °C	solid (black)
R_{gon} =	4	Ω		150 °C	dashed (red)
R_{goff} =	4	Ω			

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



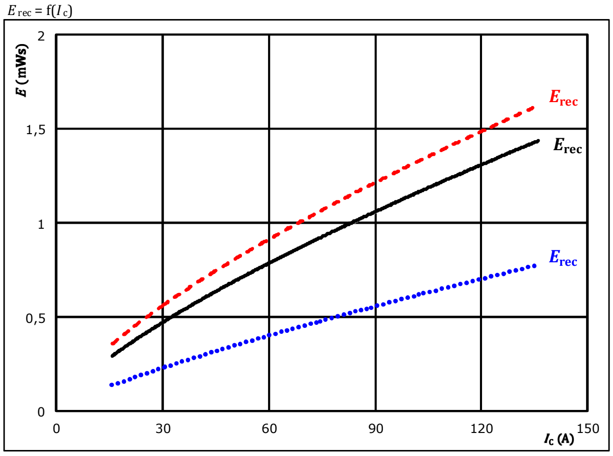
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	dotted (blue)
V_{GE} =	±15	V		125 °C	solid (black)
I_C =	76	A		150 °C	dashed (red)

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



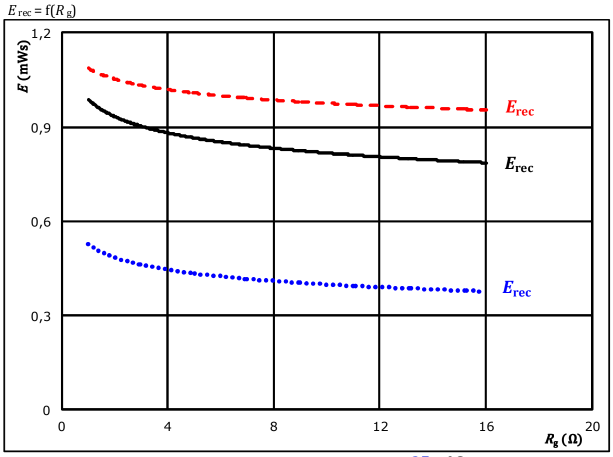
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	dotted (blue)
V_{GE} =	±15	V		125 °C	solid (black)
R_{gon} =	4	Ω		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

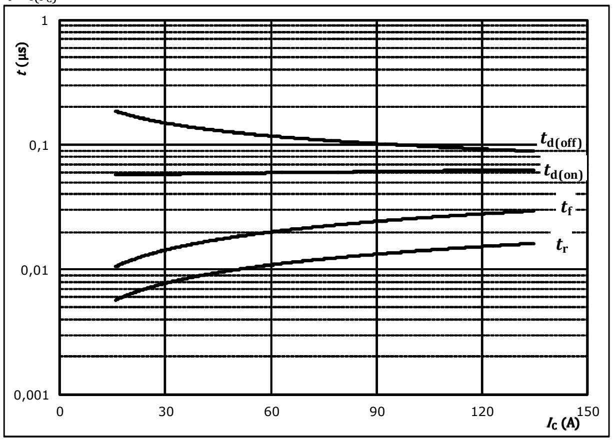
V_{CE} =	350	V	T_j:	25 °C	dotted (blue)
V_{GE} =	±15	V		125 °C	solid (black)
I_C =	76	A		150 °C	dashed (red)

Low Boost Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



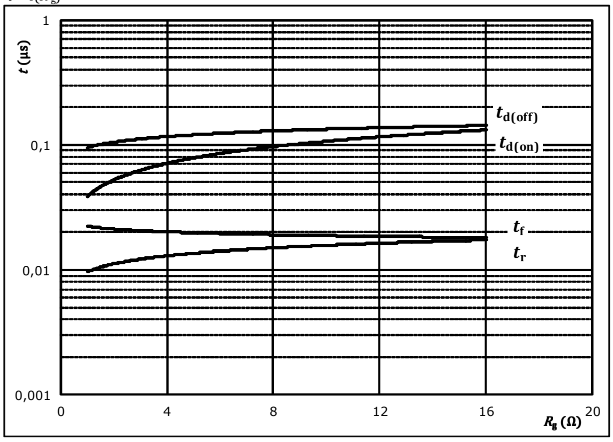
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$t = f(R_g)$



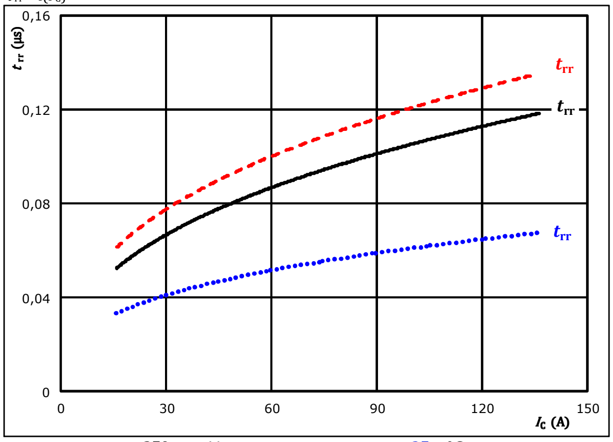
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	76	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

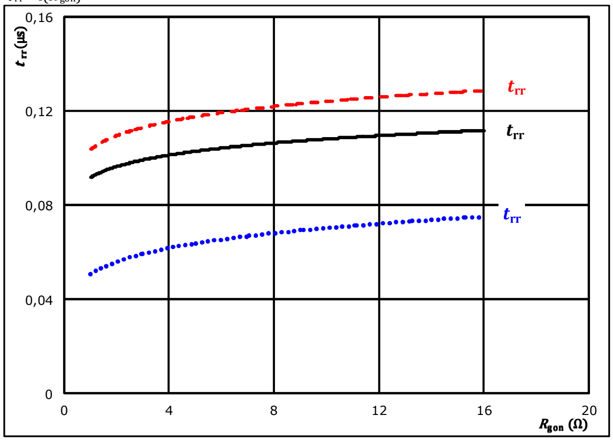


At					
V_{CE} =	350	V		25 °C	dotted
V_{GE} =	±15	V	T_j:	125 °C	solid
R_{gon} =	4	Ω		150 °C	dashed

figure 8. FWD

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

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



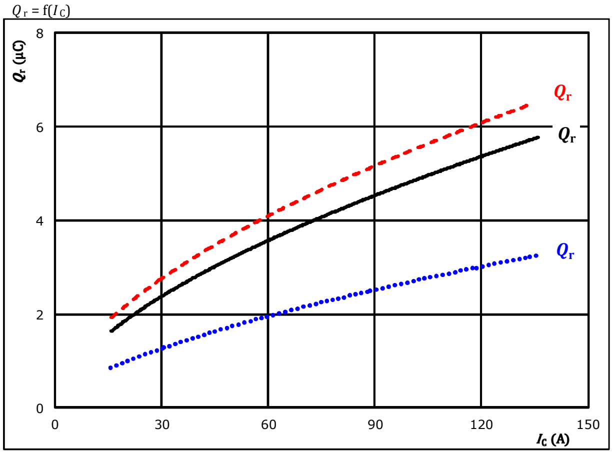
At					
V_{CE} =	350	V		25 °C	dotted
V_{GE} =	±15	V	T_j:	125 °C	solid
I_C =	76	A		150 °C	dashed

Low Boost Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

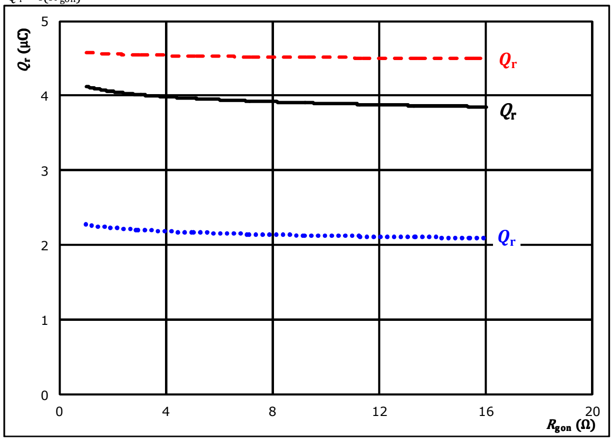


At						
V_{CE} =	350	V		25	°C	•••••••••••••
V_{GE} =	±15	V	T_j:	125	°C	———
R_{gon} =	4	Ω		150	°C	— — —

figure 10. FWD

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

$Q_r = f(R_{gon})$

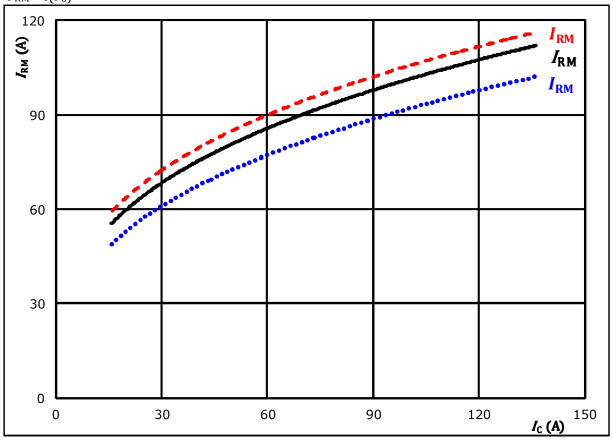


At						
V_{CE}=	350	V		25	°C	•••••••••••••
V_{GE} =	±15	V	T_j:	125	°C	———
I_C=	76	A		150	°C	— — —

figure 11. FWD

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

$I_{RM} = f(I_C)$

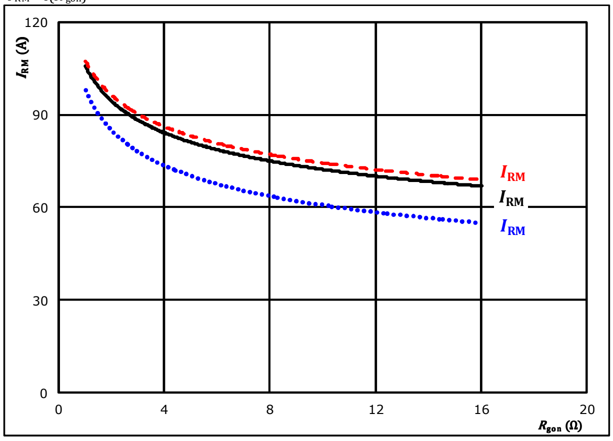


At						
V_{CE}:	350	V		25	°C	•••••••••••••
V_{GE} =	±15	V	T_j:	125	°C	———
R_{gon} =	4	Ω		150	°C	— — —

figure 12. FWD

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

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



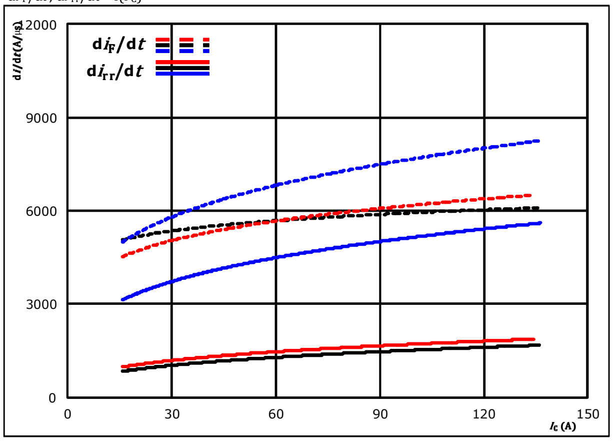
At						
V_{CE} =	350	V		25	°C	•••••••••••••
V_{GE} =	±15	V	T_j:	125	°C	———
I_C =	76	A		150	°C	— — —

Low Boost Switching Characteristics

figure 13. FWD

Typical rate of fall of forward and reverse recovery current as a function of collector current

$di_F/dt, di_{rr}/dt = f(I_C)$



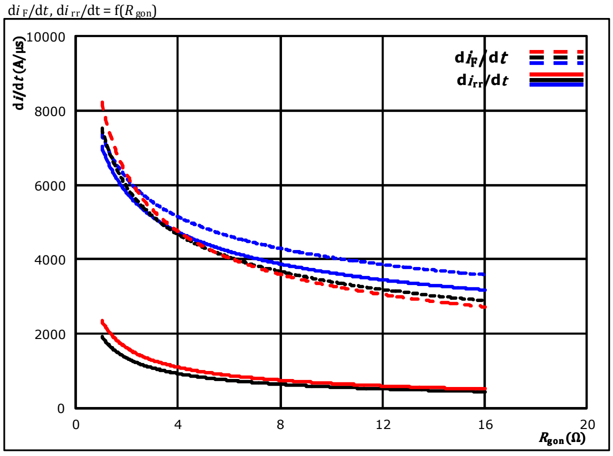
At

V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	4	Ω		150 °C	dashed

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

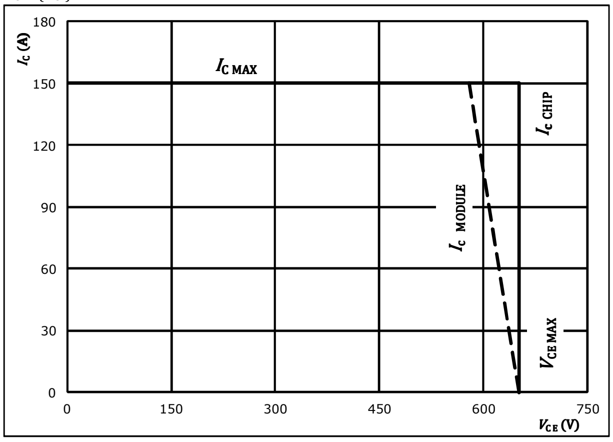
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C =	76	A		150 °C	dashed

Boost Switching Characteristics

figure 15. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

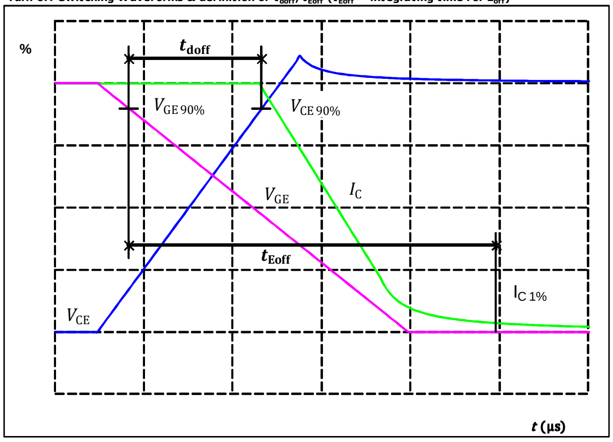
T_j =	175	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Low Boost Switching Definitions

General conditions		
T_j	=	125 °C
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

figure 1. IGBT

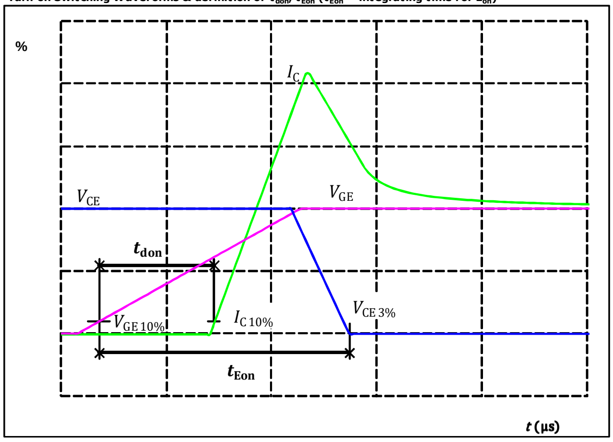
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	76	A
t_{doff} =	106	ns

figure 2. IGBT

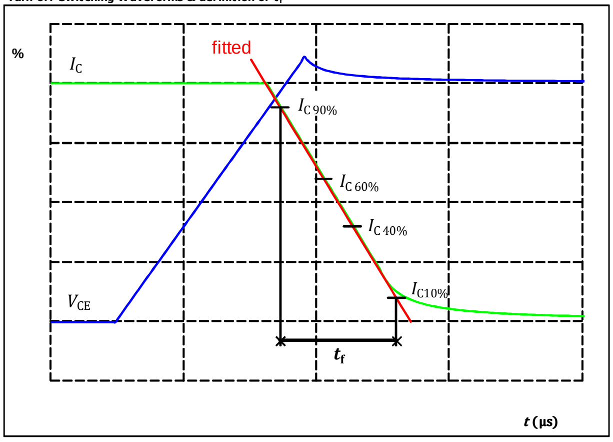
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	76	A
t_{don} =	62	ns

figure 3. IGBT

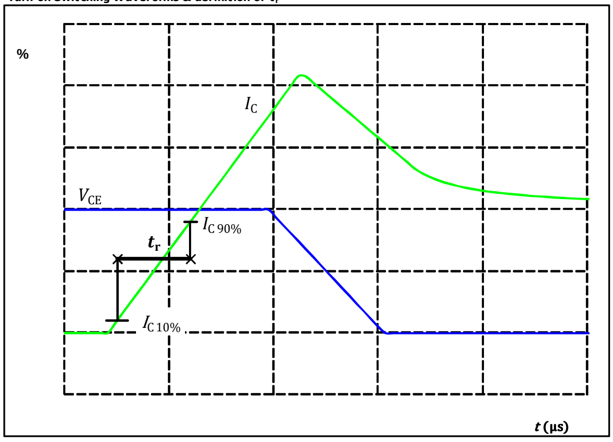
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	76	A
t_f =	17	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

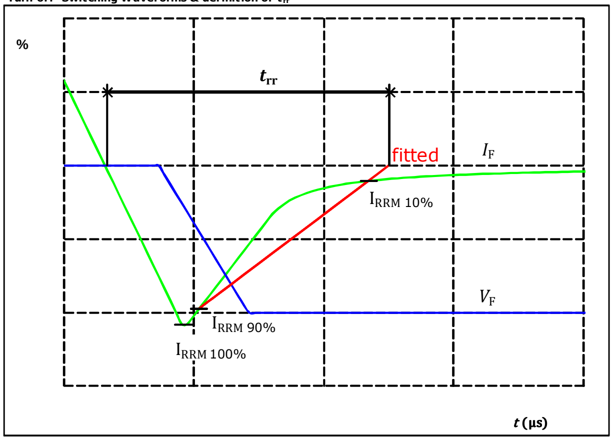


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	76	A
t_r =	10	ns

Low Boost Switching Characteristics

figure 5. **FWD**

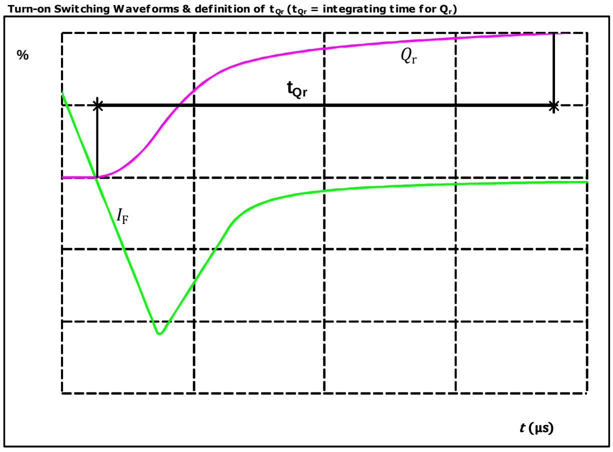
Turn-off Switching Waveforms & definition of t_{rr}



V_F (100%) =	350	V
I_F (100%) =	76	A
I_{RRM} (100%) =	93	A
t_{rr} =	100	ns

figure 6. **FWD**

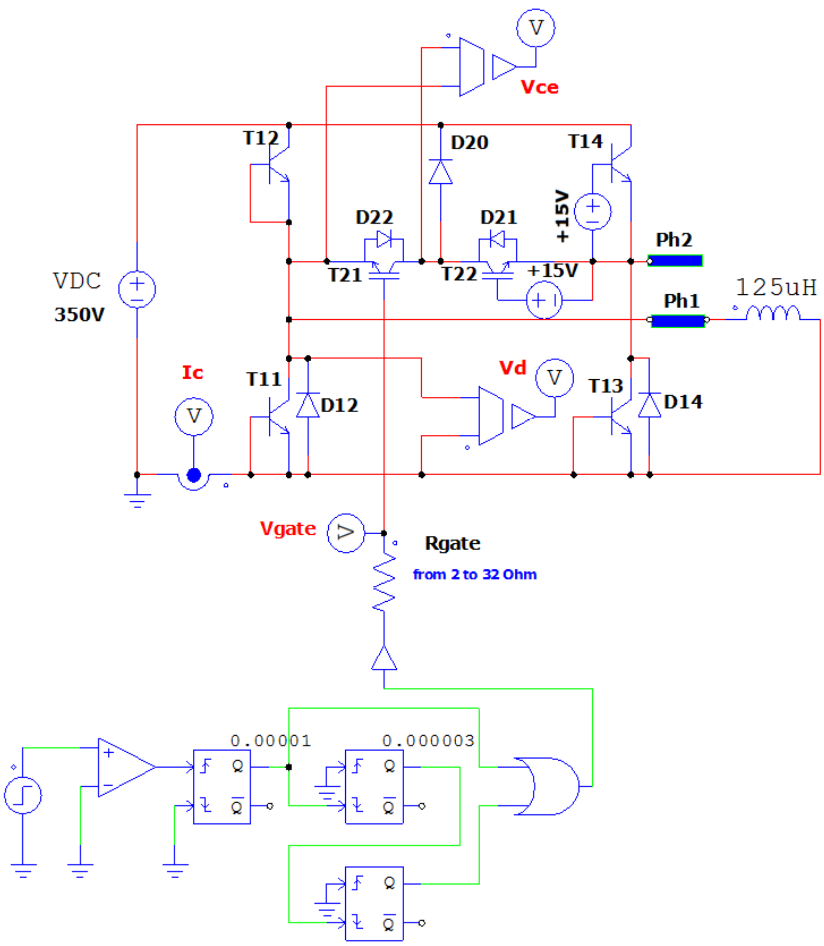
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	76	A
Q_r (100%) =	4,08	µC

Low Boost Switching measurement circuit

figure 1.

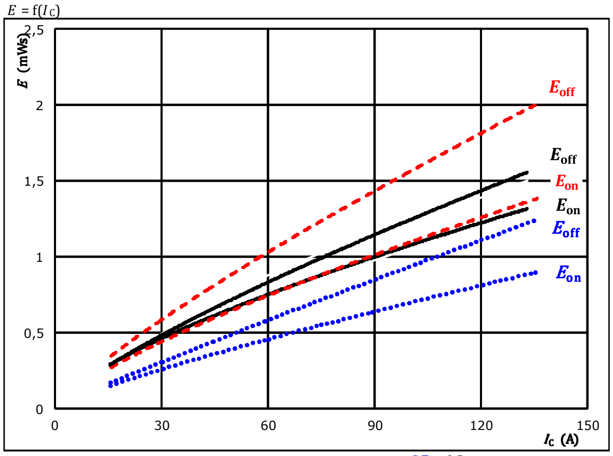


High Boost Switching Characteristics

figure 1. IGBT

Typical switching energy losses as a function of collector current

$E = f(I_C)$



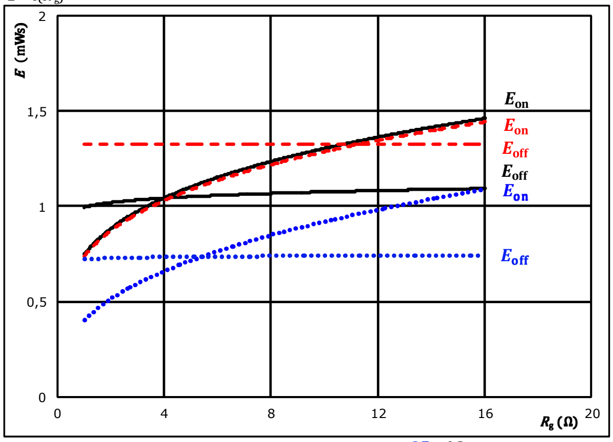
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C (dotted)
V_{GE} =	±15	V		125 °C (solid)
R_{gon} =	4	Ω		150 °C (dashed)
R_{goff} =	4	Ω		

figure 2. IGBT

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



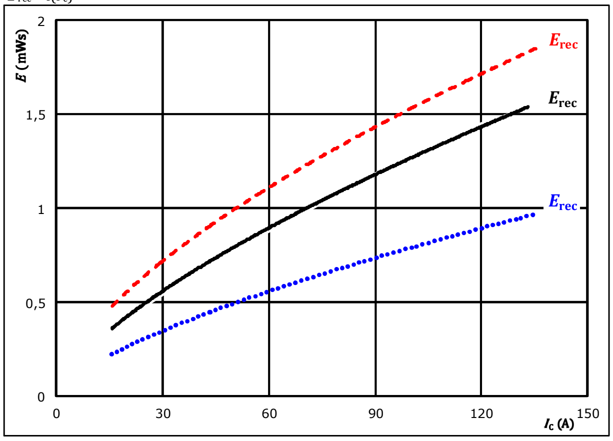
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C (dotted)
V_{GE} =	±15	V		125 °C (solid)
I_C =	76	A		150 °C (dashed)

figure 3. FWD

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_c)$



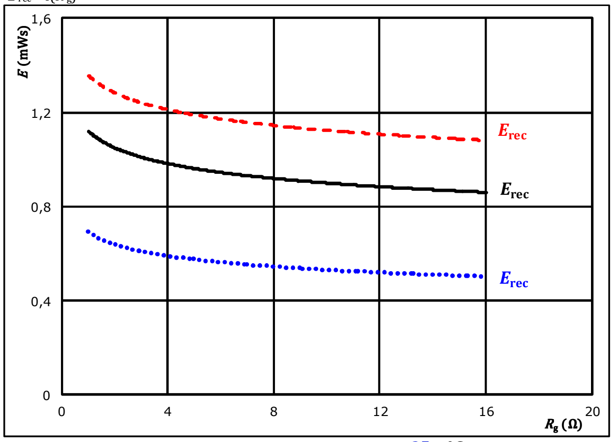
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C (dotted)
V_{GE} =	±15	V		125 °C (solid)
R_{gon} =	4	Ω		150 °C (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

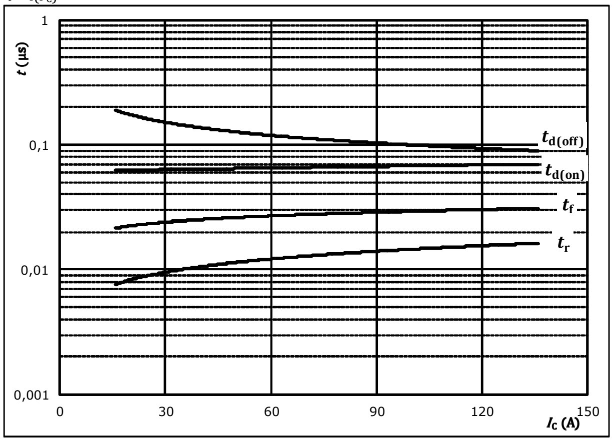
V_{CE} =	350	V	T_j:	25 °C (dotted)
V_{GE} =	±15	V		125 °C (solid)
I_C =	76	A		150 °C (dashed)

High Boost Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



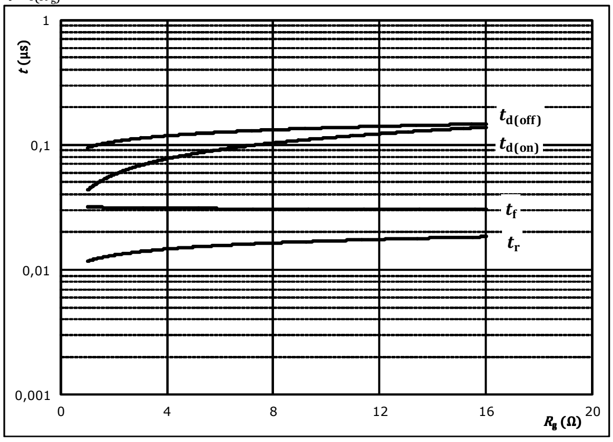
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$t = f(R_g)$



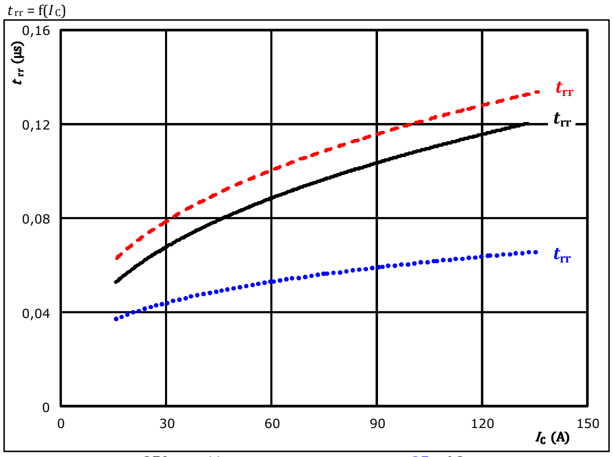
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	76	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

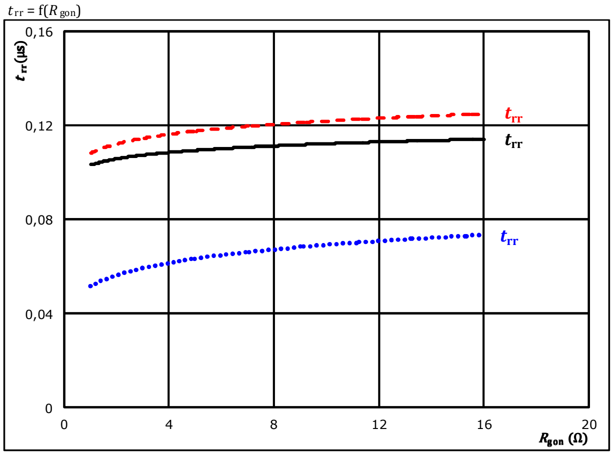


At					
V_{CE} =	350	V		25 °C	···········
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	4	Ω		150 °C	– – –

figure 8. FWD

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

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



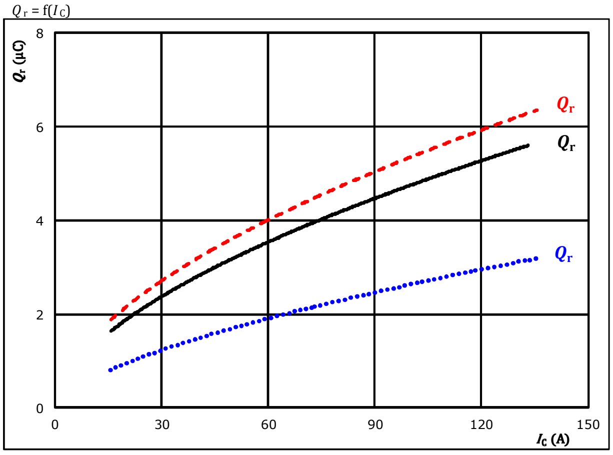
At					
V_{CE} =	350	V		25 °C	···········
V_{GE} =	±15	V	T_j:	125 °C	———
I_C =	76	A		150 °C	– – –

High Boost Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

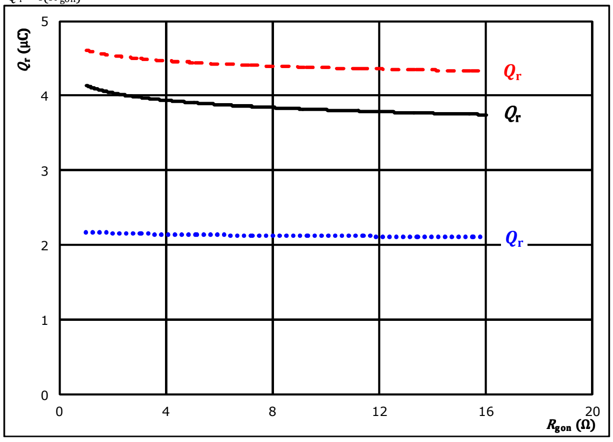


At	V_{CE} =	350	V		25 °C	dotted (blue)
	V_{GE} =	±15	V	T_j:	125 °C	solid (black)
	R_{gon} =	4	Ω		150 °C	dashed (red)

figure 10. FWD

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

$Q_r = f(R_{gon})$

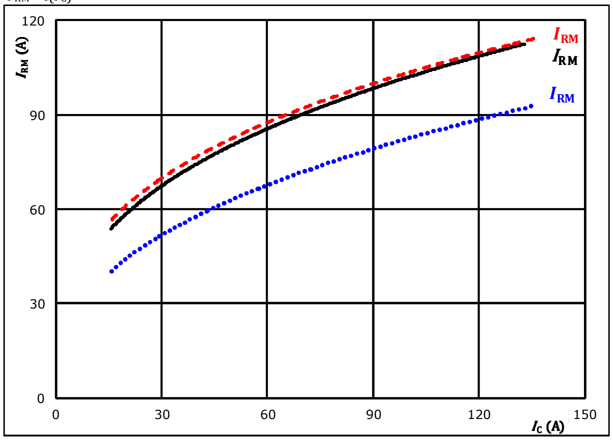


At	V_{CE}=	350	V		25 °C	dotted (blue)
	V_{GE} =	±15	V	T_j:	125 °C	solid (black)
	I_C=	76	A		150 °C	dashed (red)

figure 11. FWD

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

$I_{RM} = f(I_C)$

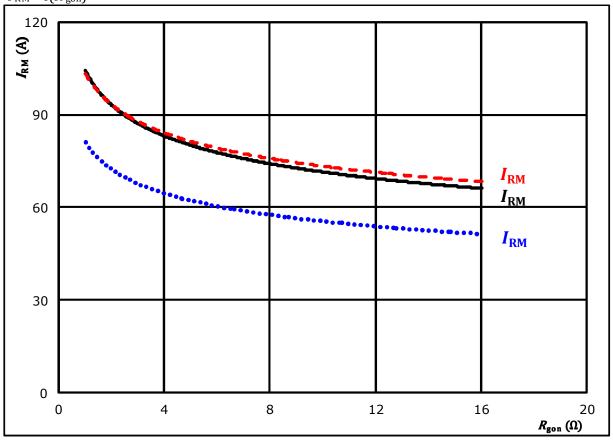


At	V_{CE}:	350	V		25 °C	dotted (blue)
	V_{GE} =	±15	V	T_j:	125 °C	solid (black)
	R_{gon} =	4	Ω		150 °C	dashed (red)

figure 12. FWD

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

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



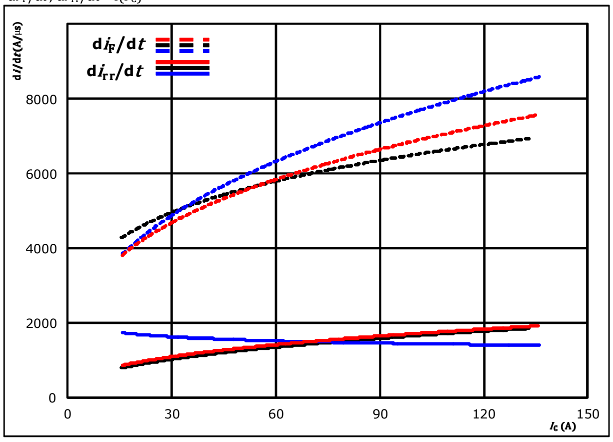
At	V_{CE} =	350	V		25 °C	dotted (blue)
	V_{GE} =	±15	V	T_j:	125 °C	solid (black)
	I_C =	76	A		150 °C	dashed (red)

High Boost Switching Characteristics

figure 13. FWD

Typical rate of fall of forward and reverse recovery current as a function of collector current

di_F/dt, $di_{rr}/dt = f(I_C)$

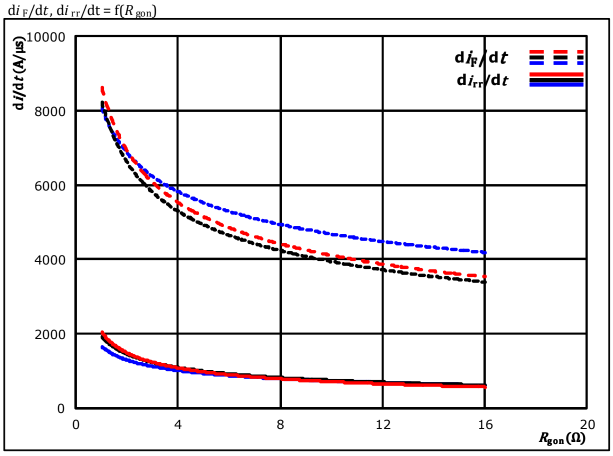


At					
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	4	Ω		150 °C	dashed

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, $di_{rr}/dt = f(R_{gon})$



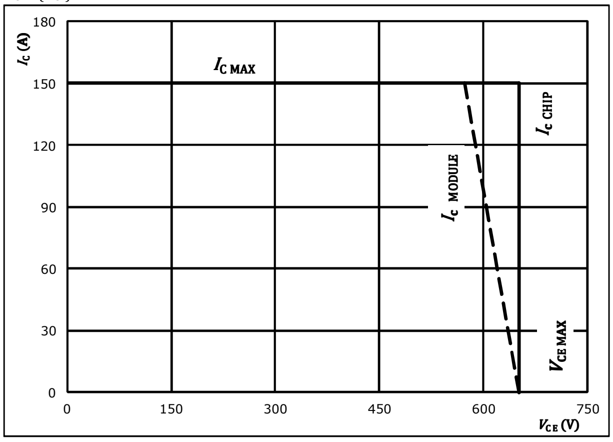
At					
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C =	76	A		150 °C	dashed

Boost Switching Characteristics

figure 15. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At		
T_j =	175	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

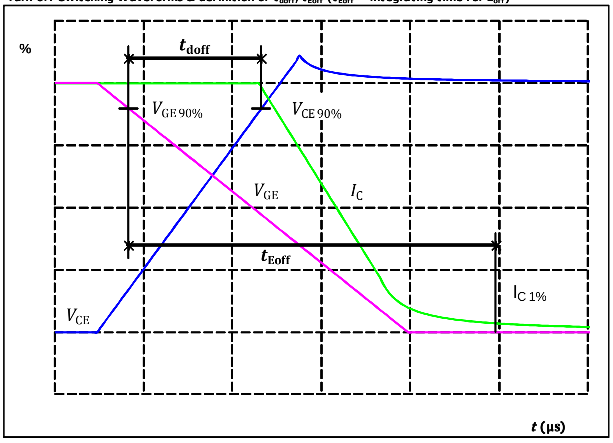
Vincotech

High Boost Switching Definitions

General conditions		
T_j	=	125 °C
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

figure 1. **IGBT**

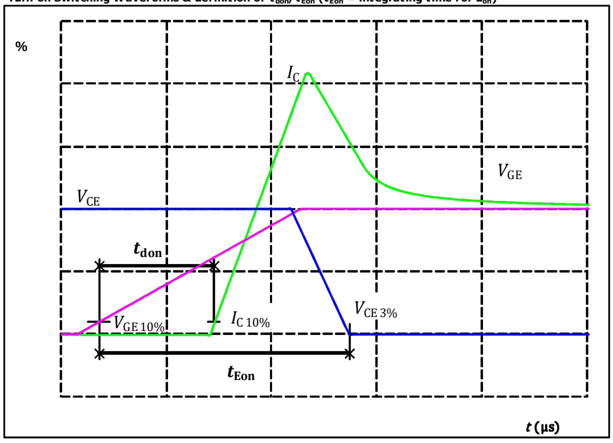
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	76	A
t_{doff} =	105	ns

figure 2. **IGBT**

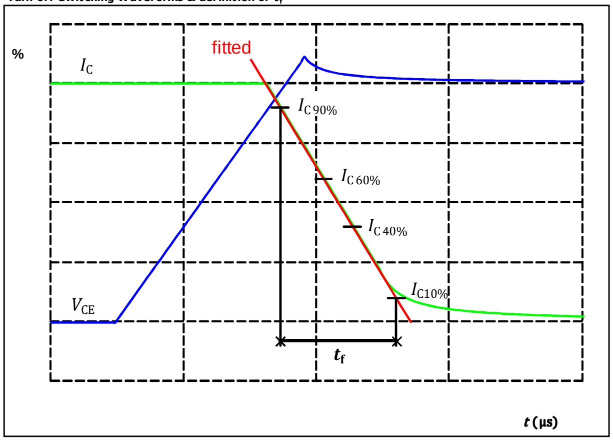
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	76	A
t_{don} =	64	ns

figure 3. **IGBT**

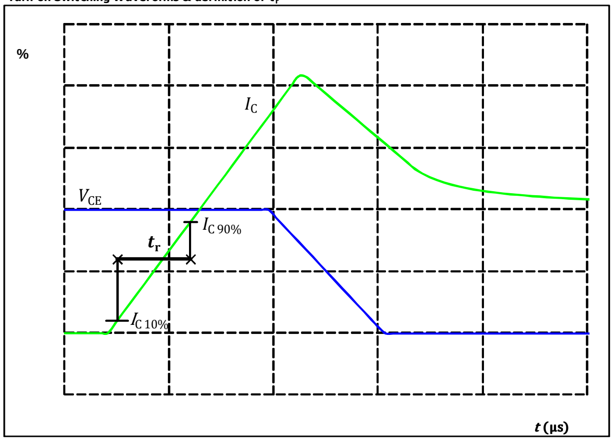
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	76	A
t_f =	21	ns

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of t_r

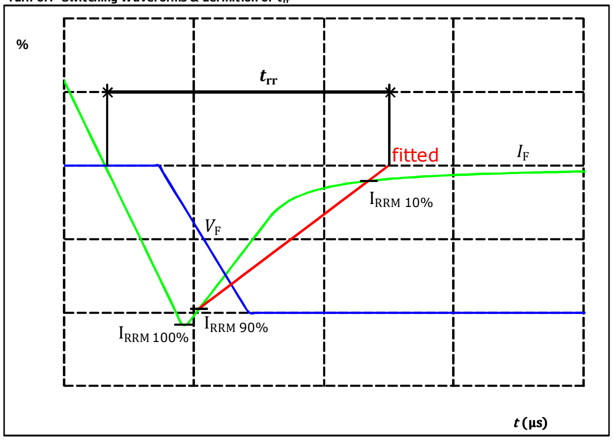


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	76	A
t_r =	11	ns

High Boost Switching Characteristics

figure 5. **FWD**

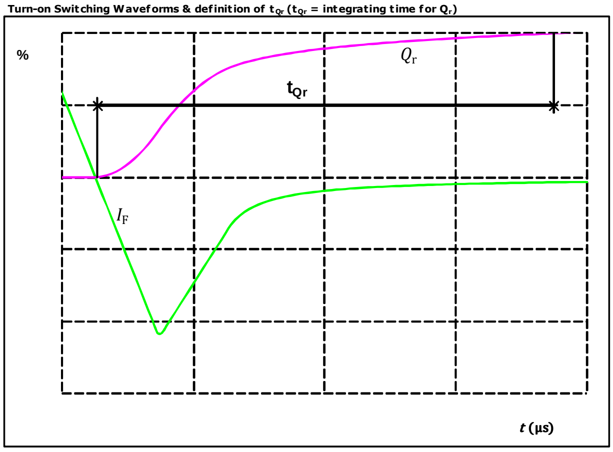
Turn-off Switching Waveforms & definition of t_{rr}



V_F (100%) =	350	V
I_F (100%) =	76	A
I_{RRM} (100%) =	92	A
t_{rr} =	105	ns

figure 6. **FWD**

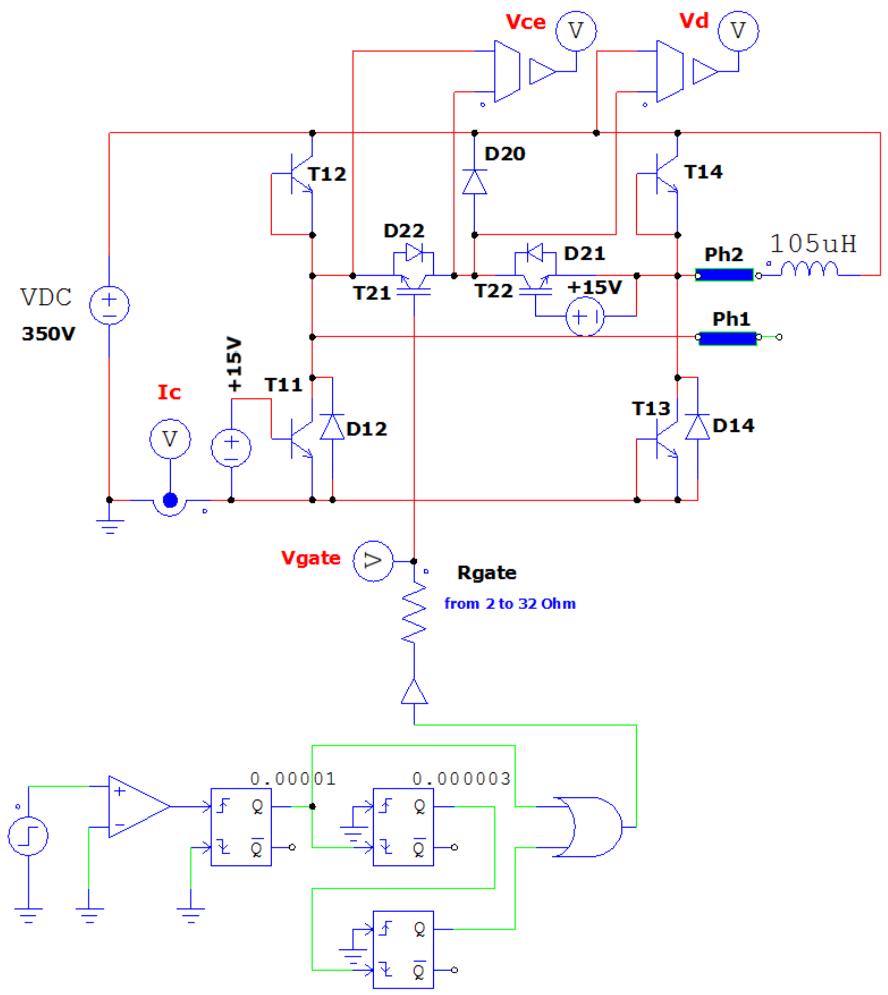
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	76	A
Q_r (100%) =	4,02	µC

High Boost Switching measurement circuit

figure 1.

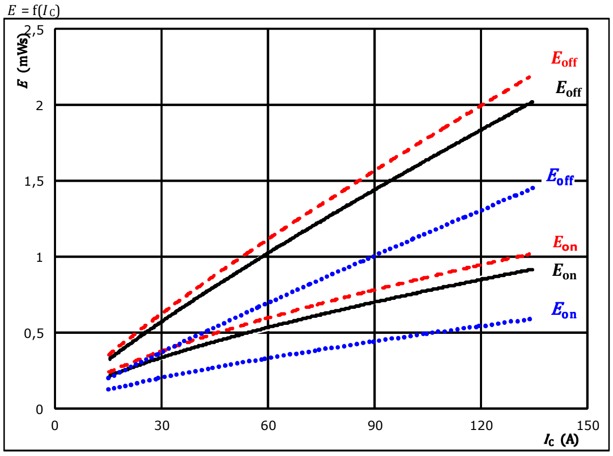


Input Boost Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



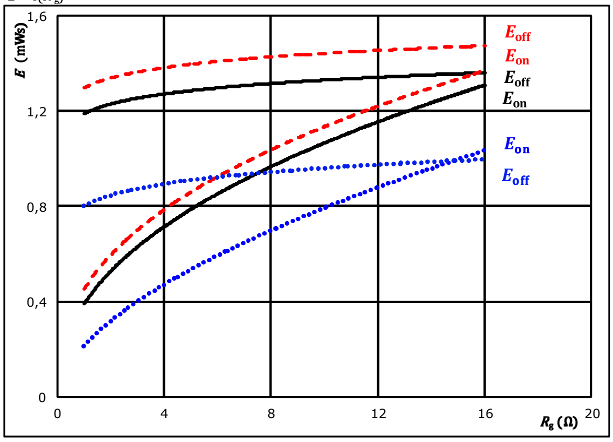
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	0 / 15	V		125 °C	solid
R_{gon} =	4	Ω		150 °C	dashed
R_{goff} =	4	Ω			

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



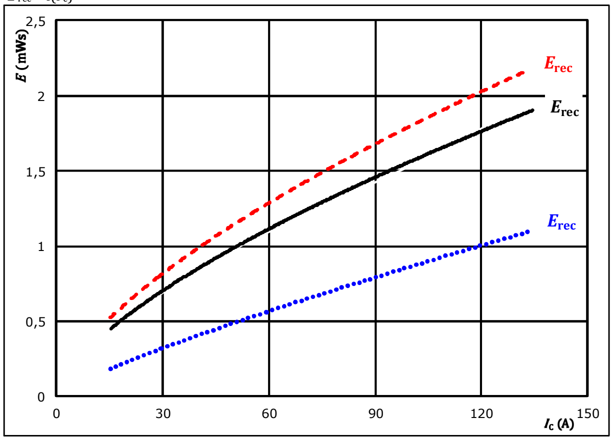
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	0 / 15	V		125 °C	solid
I_C =	75	A		150 °C	dashed

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_c)$



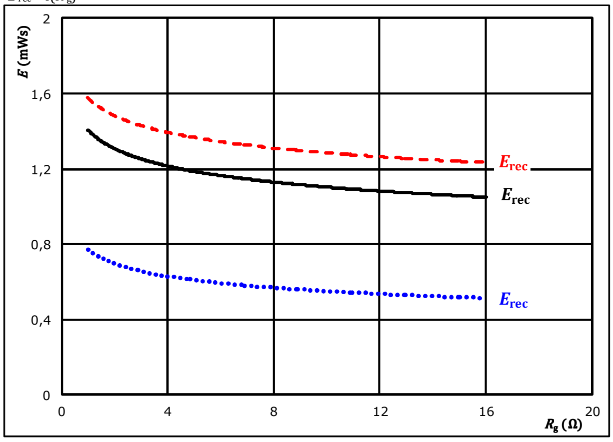
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	0 / 15	V		125 °C	solid
R_{gon} =	4	Ω		150 °C	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

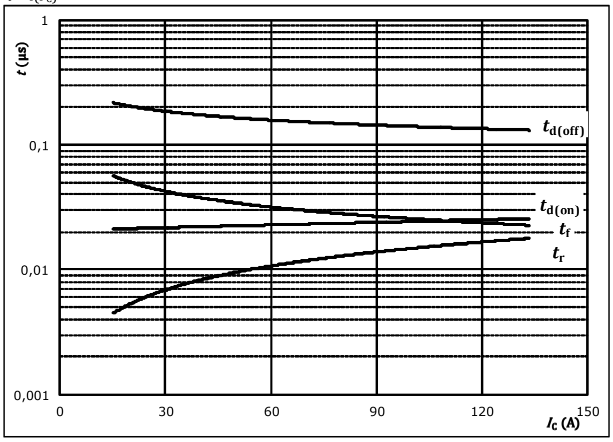
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	0 / 15	V		125 °C	solid
I_C =	75	A		150 °C	dashed

Input Boost Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



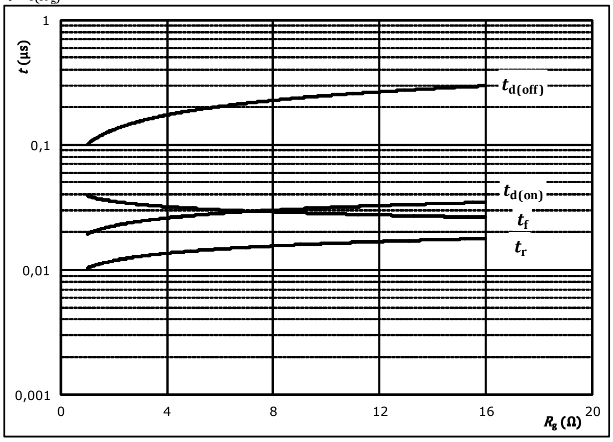
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	0 / 15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$t = f(R_g)$



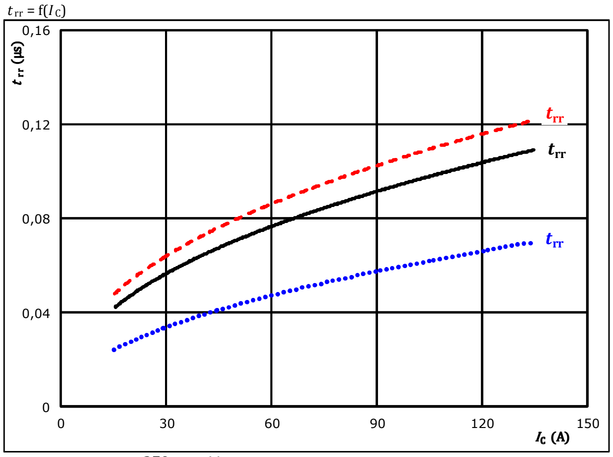
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	0 / 15	V
I_C =	75	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

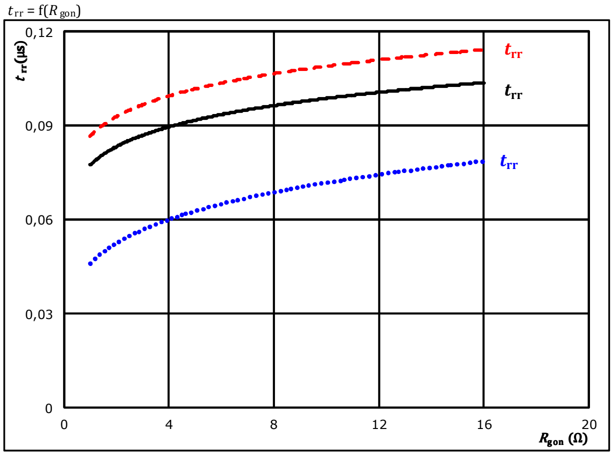


At					
V_{CE}=	350	V		25 °C	···········
V_{GE} =	0 / 15	V	T_j:	125 °C	———
R_{gon} =	4	Ω		150 °C	– – –

figure 8. FWD

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

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



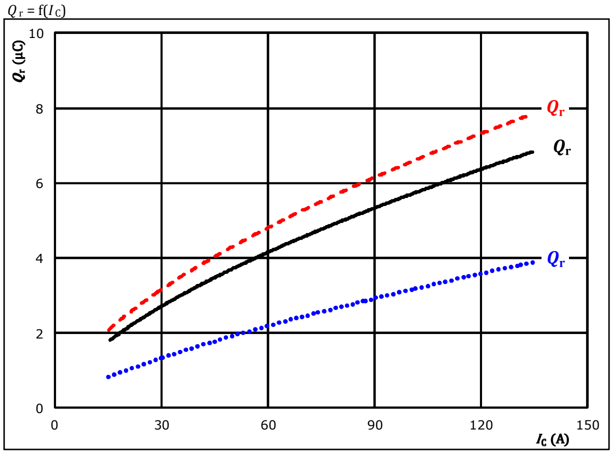
At					
V_{CE} =	350	V		25 °C	···········
V_{GE} =	0 / 15	V	T_j:	125 °C	———
I_C =	75	A		150 °C	– – –

Input Boost Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

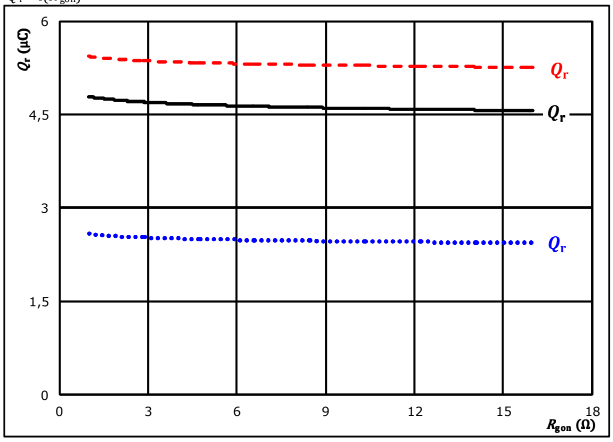


At						
V_{CE} =	350	V		25 °C	······
V_{GE} =	0 / 15	V	T_j:	125 °C	——
R_{gon} =	4	Ω		150 °C	– – –

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

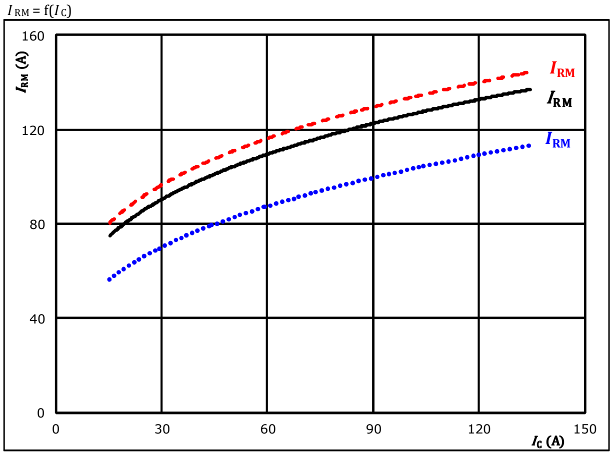


At						
V_{CE}=	350	V		25 °C	······
V_{GE} =	0 / 15	V	T_j:	125 °C	——
I_C=	75	A		150 °C	– – –

figure 11. **FWD**

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

$I_{RM} = f(I_C)$

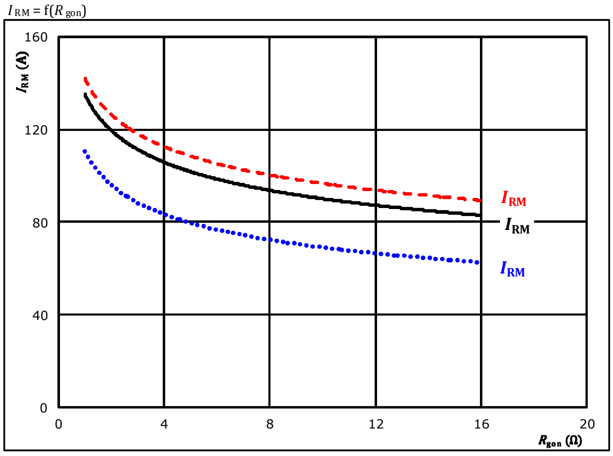


At						
V_{CE}:	350	V		25 °C	······
V_{GE} =	0 / 15	V	T_j:	125 °C	——
R_{gon} =	4	Ω		150 °C	– – –

figure 12. **FWD**

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

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



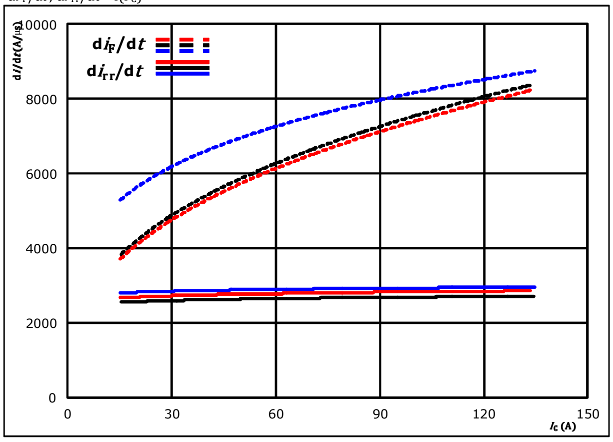
At						
V_{CE} =	350	V		25 °C	······
V_{GE} =	0 / 15	V	T_j:	125 °C	——
I_C =	75	A		150 °C	– – –

Input Boost 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)

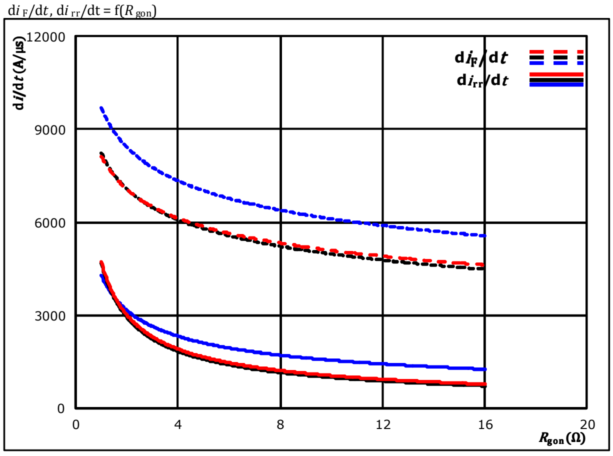


At V_{CE} = 350 V; V_{GE} = 0 / 15 V; R_{gon} = 4 Ω; T_j: 25 °C, 125 °C, 150 °C

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})



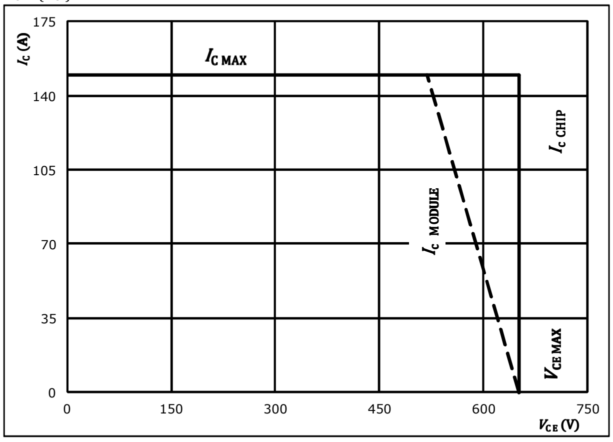
At V_{CE} = 350 V; V_{GE} = 0 / 15 V; I_C = 75 A; T_j: 25 °C, 125 °C, 150 °C

Input Boost Switching Characteristics

figure 15. IGBT

Reverse bias safe operating area

I_C = f(V_{CE})



At

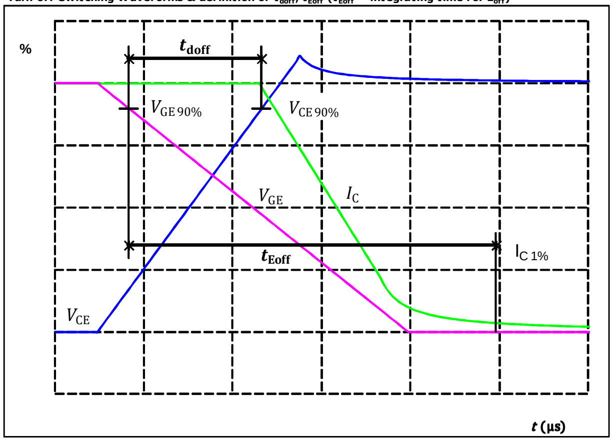
T_j = 175 °C
R_{gon} = 4 Ω
R_{goff} = 4 Ω

Input Boost Switching Definitions

General conditions		
T_j	=	125 °C
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

figure 1. IGBT

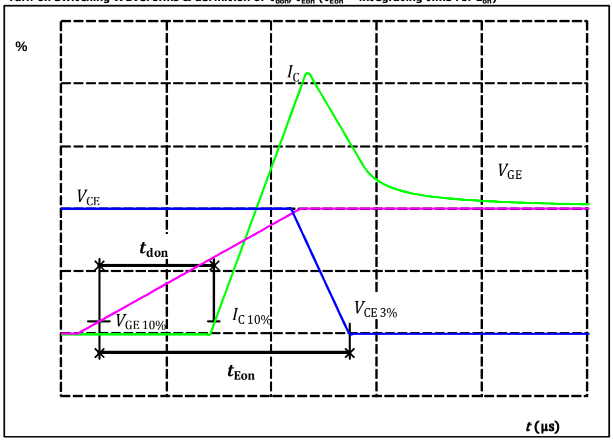
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	0	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	75	A
t_{doff} =	145	ns

figure 2. IGBT

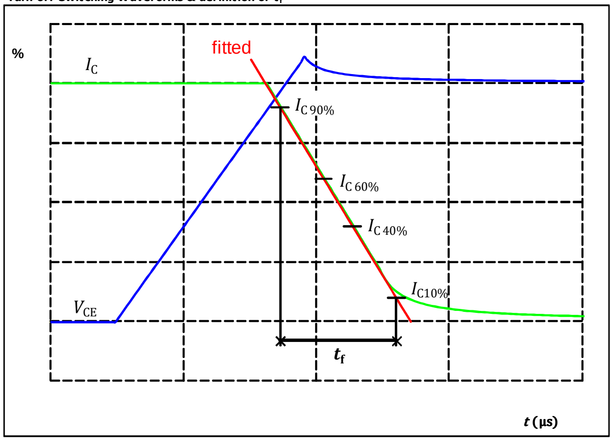
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	0	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	75	A
t_{don} =	24	ns

figure 3. IGBT

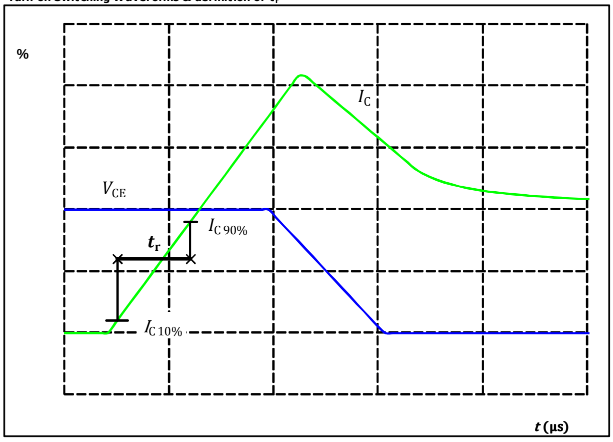
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	75	A
t_f =	30	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

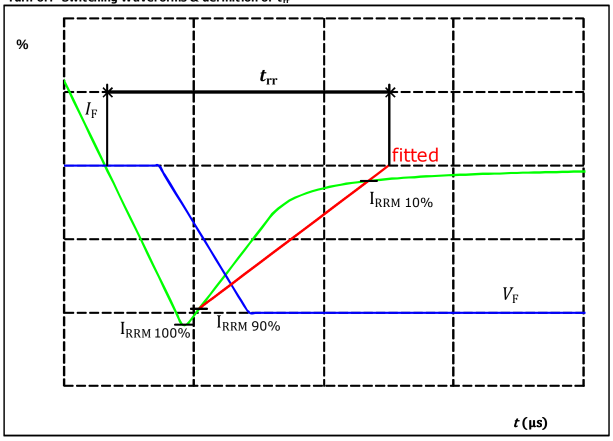


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	75	A
t_r =	12	ns

Input Boost Switching Characteristics

figure 5. **FWD**

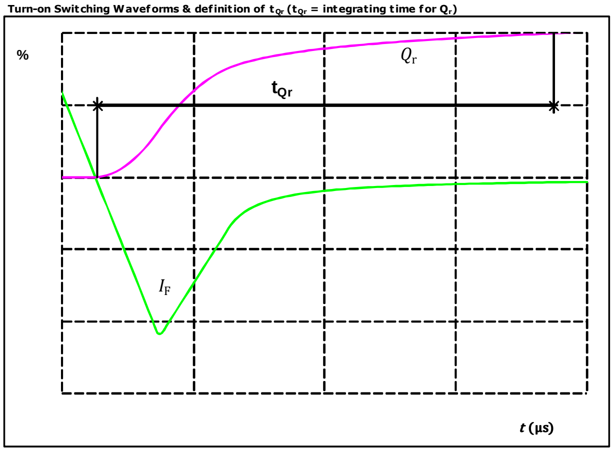
Turn-off Switching Waveforms & definition of t_{rr}



V_F (100%) =	350	V
I_F (100%) =	75	A
I_{RRM} (100%) =	116	A
t_{rr} =	84	ns

figure 6. **FWD**

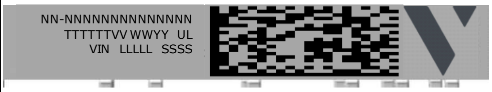
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	75	A
Q_r (100%) =	4,66	µC

Ordering Code & Marking

Version	Ordering Code
without thermal paste 12 mm housing with solder pins	10-FY07BVA075S5-LF45E18
without thermal paste 12 mm housing with press-fit pins	10-PY07BVA075S5-LF45E18Y

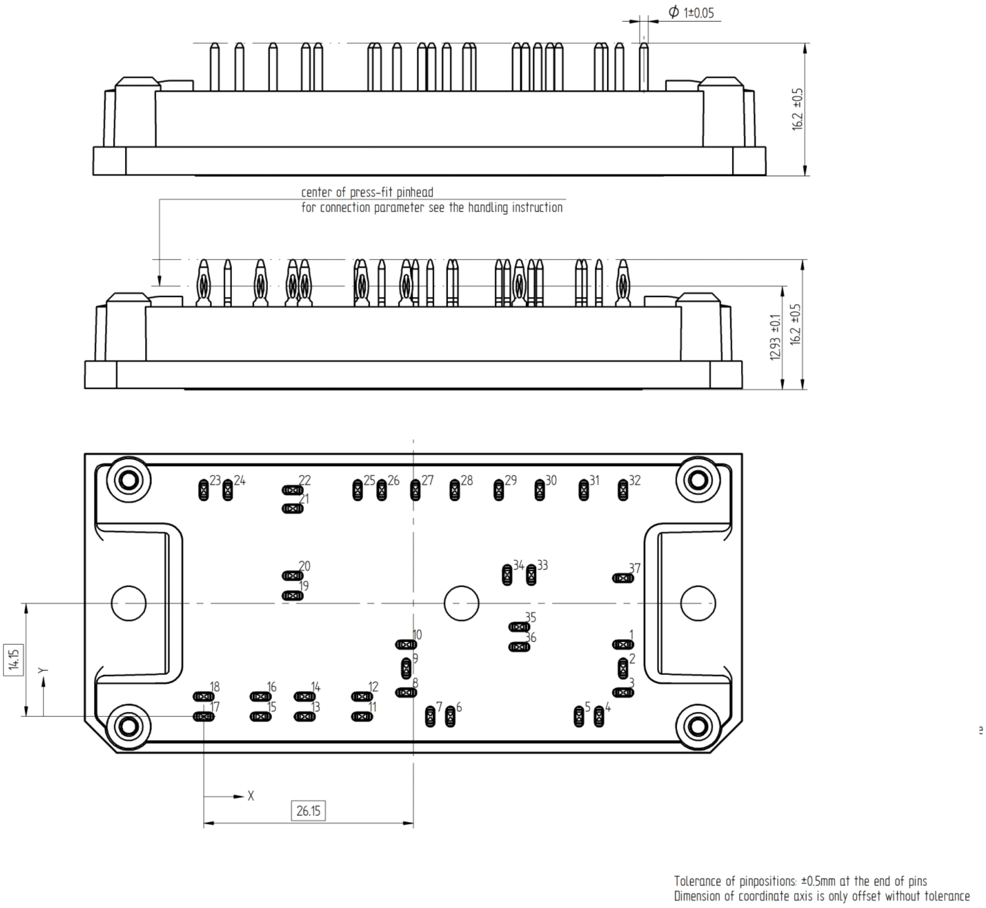


Text	Name		Date code	UL & VIN	Lot	Serial
	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
Datamatrix	Type&Ver	Lot number	Serial	Date code		
	TTTTTTTVV	LLLLL	SSSS	WWYY		

Outline

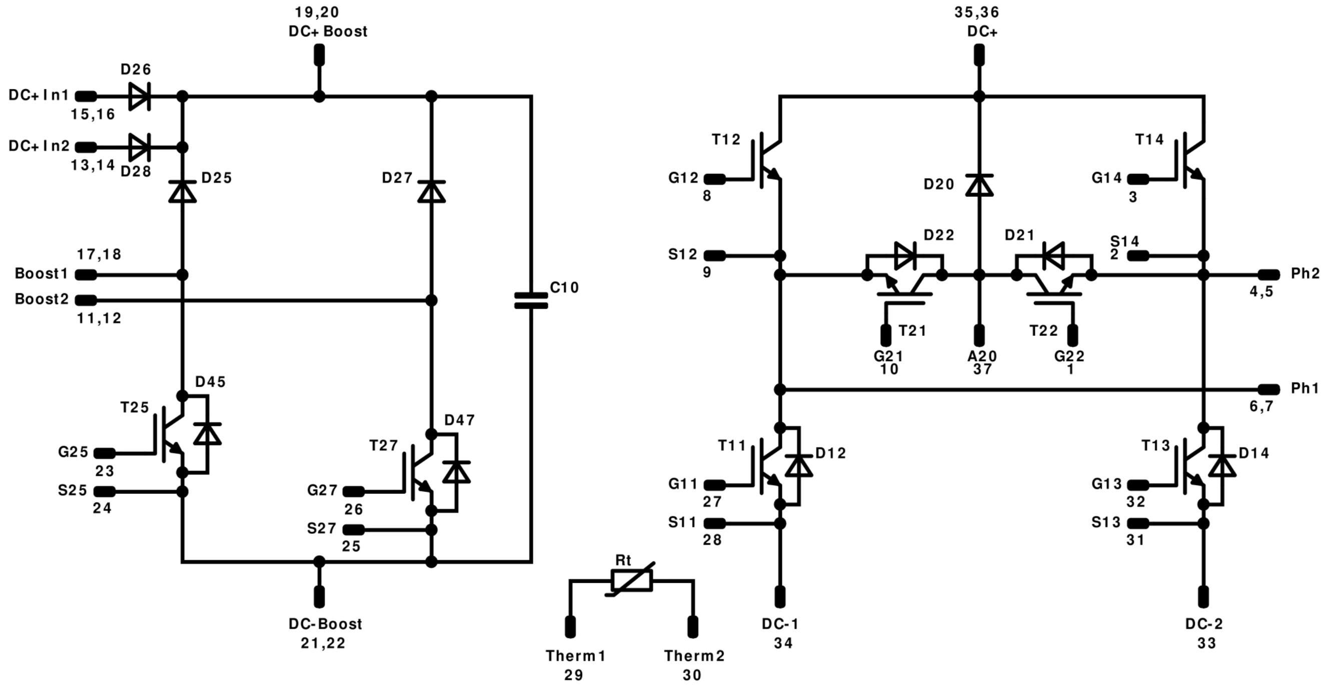
Pin table

Pin	X	Y	Function
1	52,3	9	G22
2	52,3	6	S14
3	52,3	3	G14
4	49,3	0	Ph2
5	46,8	0	Ph2
6	30,75	0	Ph1
7	28,25	0	Ph1
8	25,25	3	G12
9	25,25	6	S12
10	25,25	9	G21
11	19,75	0	Boost2
12	19,75	2,5	Boost2
13	12,6	0	DC+In2
14	12,6	2,5	DC+In2
15	7,1	0	DC+In1
16	7,1	2,5	DC+In1
17	0	0	Boost1
18	0	2,5	Boost1
19	11,1	15,1	DC+Boost
20	11,1	17,6	DC+Boost
21	11,1	26	DC-Boost
22	11,1	28,3	DC-Boost
23	0	28,3	G25
24	3	28,3	S25
25	19,2	28,3	S27
26	22,2	28,3	G27
27	26,4	28,3	G11
28	31,3	28,3	S11
29	36,8	28,3	Therm1
30	41,9	28,3	Therm2
31	47,4	28,3	S13
32	52,3	28,3	G13
33	40,85	17,7	DC-2
34	37,85	17,7	DC-1
35	39,35	11,2	DC+
36	39,35	8,7	DC+
37	52,3	17,3	A20



10-FY07BVA075S5-LF45E18
10-PY07BVA075S5-LF45E18Y
datasheet

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T13, T14	IGBT	650 V	75 A	Low Buck Switch	
T12, T14	IGBT	650 V	75 A	High Buck Switch	
D21, D22	FWD	650 V	50 A	Buck Diode	
T21, T22	IGBT	650 V	75 A	Boost Switch	
D12, D14	FWD	650 V	50 A	Low Boost Diode	
D20	FWD	650 V	50 A	High Boost Diode	
T25, T27	IGBT	650 V	75 A	Input Boost Switch	
D25, D27	FWD	650 V	75 A	Input Boost Diode	
D26, D28	Rectifier	650 V	75 A	ByPass Diode	
D45, D47	Prot. Diode	1600 V	10 A	Input Boost Sw. Protection Diode	
C10	Capacitor	630 V		Capacitor (DC)	
Rt	NTC			Thermistor	

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

Handling instruction
Handling instructions for *flow* 1 packages see vincotech.com website.

Package data
Package data for *flow* 1 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-xY07BVA075S5-LF45E18x-D1-14	02 Feb. 2018		

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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.