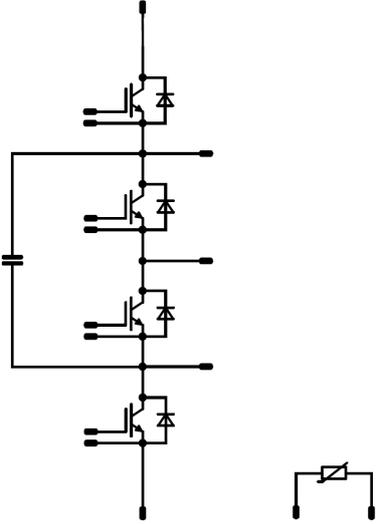




<i>flowFC 1</i>		1200 V / 200 A	
Features <ul style="list-style-type: none">• Three-level flying capacitor topology• Ultra-fast 650V components• Integrated capacitor• Integrated NTC		flow 1 12 mm housing 	
Target applications <ul style="list-style-type: none">• General		Schematic 	
Types <ul style="list-style-type: none">• 10-FY07FCA200RG-LQ45L60			

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

Parameter	Symbol	Conditions	Value	Unit
AC 1 Switch L				
Collector-emitter voltage	V_{CES}		650	V
Collector current	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	142	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	800	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	219	W
Gate-emitter voltage	V_{GES}		± 30	V
Maximum junction temperature	T_{jmax}		175	°C

AC 1 Diode L

Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	149	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	800	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	200	W
Maximum junction temperature	T_{jmax}		175	°C

AC 1 Switch H

Collector-emitter voltage	V_{CES}		650	V
Collector current	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	142	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	800	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	219	W
Gate-emitter voltage	V_{GES}		± 30	V
Maximum junction temperature	T_{jmax}		175	°C



Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
AC 1 Diode H				
Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	149	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	800	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	200	W
Maximum junction temperature	T_{jmax}		175	°C

AC 2 Switch L

Collector-emitter voltage	V_{CES}		650	V
Collector current	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	142	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	800	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	219	W
Gate-emitter voltage	V_{GES}		±30	V
Maximum junction temperature	T_{jmax}		175	°C

AC 2 Diode L

Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	149	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	800	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	200	W
Maximum junction temperature	T_{jmax}		175	°C



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Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
AC 2 Switch H				
Collector-emitter voltage	V_{CES}		650	V
Collector current	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	142	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	800	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	219	W
Gate-emitter voltage	V_{GES}		±30	V
Maximum junction temperature	T_{jmax}		175	°C

AC 2 Diode H

Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	149	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	800	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	200	W
Maximum junction temperature	T_{jmax}		175	°C

Flying Capacitor

Maximum DC voltage	V_{MAX}		630	V
Operation Temperature	T_{op}		0 ... 125	°C

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* $t_p = 2\text{ s}$	6000	V
Isolation voltage	V_{isol}	AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			min. 12,7	mm
Clearance			11,32	mm
Comparative Tracking Index	CTI		≥ 600	

*100 % tested in production



Characteristic Values

Parameter	Symbol	Conditions					Values			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		

AC 1 Switch L

Static

Gate-emitter threshold voltage	$V_{GE(th)}$		5	0,132	25	5	6	7	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	15		200	25 125 150		1,5 1,66 1,7	1,9 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}	0	650		25			0,04	mA
Gate-emitter leakage current	I_{GES}	30	0		25			0,8	μA
Internal gate resistance	r_g						None		Ω
Input capacitance	C_{ies}						16800		pF
Output capacitance	C_{oes}	$f = 1$ Mhz	0	30	25		416		pF
Reverse transfer capacitance	C_{res}						316		pF
Gate charge	Q_g		15	400	200	25		564	nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)					0,43		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$					25 125 150		205,44 191,36 187,2	ns
Rise time	t_r	$R_{gon} = 16$ Ω $R_{goff} = 16$ Ω				25 125 150		38,72 40 39,68	ns
Turn-off delay time	$t_{d(off)}$		-5/15	600	160	25 125 150		613,44 657,28 671,04	ns
Fall time	t_f					25 125 150		22,3 15,31 12,71	ns
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 4,24$ μC $Q_{tFWD} = 7,91$ μC $Q_{tFWD} = 9,48$ μC				25 125 150		9,8 11,74 12,35	mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		6,53 7,65 7,76	mWs



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Characteristic Values

Parameter	Symbol	Conditions					Values			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		
AC 1 Diode L										
Static										
Forward voltage	V_F			200	25 125 150		1,51 1,57 1,54	1,9 ⁽¹⁾		V
Reverse leakage current	I_R	$V_T = 650$ V			25			40		μA
Thermal										
Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)					0,48			K/W
Dynamic										
Peak recovery current	I_{RRM}				25 125 150		111,24 139,02 148,44			A
Reverse recovery time	t_{rr}				25 125 150		84,92 118,6 125,12			ns
Recovered charge	Q_r	$di/dt=4670$ A/μs $di/dt=4496$ A/μs $di/dt=4512$ A/μs	-5/15	600	160	25 125 150	4,24 7,91 9,48			μC
Reverse recovered energy	E_{rec}				25 125 150		0,83 1,7 2,1			mWs
Peak rate of fall of recovery current	$(di_r/dt)_{max}$				25 125 150		4933 3021 2302			A/μs



Characteristic Values

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

AC 1 Switch H

Static

Gate-emitter threshold voltage	$V_{GE(th)}$			5	0,132	25	5	6	7	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		200	25 125 150		1,5 1,66 1,7	1,9 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	650		25			0,04	mA
Gate-emitter leakage current	I_{GES}		30	0		25			0,8	µA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}							16800		pF
Output capacitance	C_{oes}	$f = 1$ Mhz	0	30		25		416		pF
Reverse transfer capacitance	C_{res}							316		pF
Gate charge	Q_g		15	400	200	25		564		nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,43		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$					25 125 150		205,44 191,36 187,2		ns
Rise time	t_r					25 125 150		38,72 40 39,68		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		613,44 657,28 671,04		ns
Fall time	t_f					25 125 150		22,3 15,31 12,71		ns
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD}=4,24$ µC $Q_{tFWD}=7,91$ µC $Q_{tFWD}=9,48$ µC				25 125 150		9,8 11,74 12,35		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		6,53 7,65 7,76		mWs



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Characteristic Values

Parameter	Symbol	Conditions					Values			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		
AC 1 Diode H										
Static										
Forward voltage	V_F			200	25 125 150		1,51 1,57 1,54	1,9 ⁽¹⁾		V
Reverse leakage current	I_R	$V_T = 650$ V			25			40		μA
Thermal										
Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)					0,48			K/W
Dynamic										
Peak recovery current	I_{RRM}				25 125 150		111,24 139,02 148,44			A
Reverse recovery time	t_{rr}				25 125 150		84,92 118,6 125,12			ns
Recovered charge	Q_r	$di/dt=4670$ A/μs $di/dt=4496$ A/μs $di/dt=4512$ A/μs	-5/15	600	160	25 125 150	4,24 7,91 9,48			μC
Reverse recovered energy	E_{rec}				25 125 150		0,83 1,7 2,1			mWs
Peak rate of fall of recovery current	$(di_r/dt)_{max}$				25 125 150		4933 3021 2302			A/μs



Vincotech

Characteristic Values

Parameter	Symbol	Conditions					Values			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		

AC 2 Switch L

Static

Gate-emitter threshold voltage	$V_{GE(th)}$		5	0,132	25	5	6	7	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	15		200	25 125 150		1,5 1,66 1,7	1,9 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}	0	650		25			0,04	mA
Gate-emitter leakage current	I_{GES}	30	0		25			0,8	μA
Internal gate resistance	r_g						None		Ω
Input capacitance	C_{ies}						16800		pF
Output capacitance	C_{oes}	$f = 1$ Mhz	0	30	25		416		pF
Reverse transfer capacitance	C_{res}						316		pF
Gate charge	Q_g	15	400	200	25		564		nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)					0,43		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$					25 125 150		207,36 193,28 189,44	ns
Rise time	t_r	$R_{gon} = 16$ Ω $R_{goff} = 16$ Ω				25 125 150		34,24 35,52 35,84	ns
Turn-off delay time	$t_{d(off)}$		-5/15	600	160	25 125 150		601,92 645,76 658,88	ns
Fall time	t_f					25 125 150		17,03 10,44 10,61	ns
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 4,02$ μC $Q_{tFWD} = 7,75$ μC $Q_{tFWD} = 9,33$ μC				25 125 150		9,88 11,63 12,43	mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		6,48 7,53 7,9	mWs



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Characteristic Values

Parameter	Symbol	Conditions					Values			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		
AC 2 Diode L										
Static										
Forward voltage	V_F			200	25 125 150		1,51 1,57 1,54	1,9 ⁽¹⁾		V
Reverse leakage current	I_R	$V_r = 650$ V			25			40		μA
Thermal										
Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)					0,48			K/W
Dynamic										
Peak recovery current	I_{RRM}				25 125 150		113,79 141,42 151,13			A
Reverse recovery time	t_{rr}				25 125 150		84,55 120,06 127,75			ns
Recovered charge	Q_r	$di/dt=4858$ A/μs $di/dt=4791$ A/μs $di/dt=4823$ A/μs	-5/15	600	160	25 125 150	4,02 7,75 9,33			μC
Reverse recovered energy	E_{rec}				25 125 150		0,757 1,66 2,03			mWs
Peak rate of fall of recovery current	$(di_r/dt)_{max}$				25 125 150		5790 3653 2742			A/μs



Characteristic Values

Parameter	Symbol	Conditions					Values			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		

AC 2 Switch H

Static

Gate-emitter threshold voltage	$V_{GE(th)}$		5	0,132	25	5	6	7	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	15		200	25 125 150		1,5 1,66 1,7	1,9 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}	0	650		25			0,04	mA
Gate-emitter leakage current	I_{GES}	30	0		25			0,8	μA
Internal gate resistance	r_g						None		Ω
Input capacitance	C_{ies}						16800		pF
Output capacitance	C_{oes}	$f = 1$ Mhz	0	30	25		416		pF
Reverse transfer capacitance	C_{res}						316		pF
Gate charge	Q_g		15	400	200	25		564	nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,43	K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$					25 125 150		207,36 193,28 189,44	ns
Rise time	t_r	$R_{gon} = 16$ Ω $R_{goff} = 16$ Ω				25 125 150		34,24 35,52 35,84	ns
Turn-off delay time	$t_{d(off)}$		-5/15	600	160	25 125 150		601,92 645,76 658,88	ns
Fall time	t_f					25 125 150		17,03 10,44 10,61	ns
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 4,02$ μC $Q_{tFWD} = 7,75$ μC $Q_{tFWD} = 9,33$ μC				25 125 150		9,88 11,63 12,43	mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		6,48 7,53 7,9	mWs



Vincotech

Characteristic Values

Parameter	Symbol	Conditions					Values			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		
AC 2 Diode H										
Static										
Forward voltage	V_F			200	25 125 150		1,51 1,57 1,54	1,9 ⁽¹⁾		V
Reverse leakage current	I_R	$V_r = 650$ V			25			40		μA
Thermal										
Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)					0,48			K/W
Dynamic										
Peak recovery current	I_{RRM}				25 125 150		113,79 141,42 151,13			A
Reverse recovery time	t_{rr}				25 125 150		84,55 120,06 127,75			ns
Recovered charge	Q_r	$di/dt=4858$ A/μs $di/dt=4791$ A/μs $di/dt=4823$ A/μs	-5/15	600	160	25 125 150	4,02 7,75 9,33			μC
Reverse recovered energy	E_{rec}				25 125 150		0,757 1,66 2,03			mWs
Peak rate of fall of recovery current	$(di_r/dt)_{max}$				25 125 150		5790 3653 2742			A/μs



Vincotech

Characteristic Values

Parameter	Symbol	Conditions					Values			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		

Flying Capacitor

Static

Capacitance	C							150		nF
Tolerance							-10		10	%

Thermistor

Static

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

⁽¹⁾ Value at chip level

⁽²⁾ Only valid with pre-applied Vincotech thermal interface material.

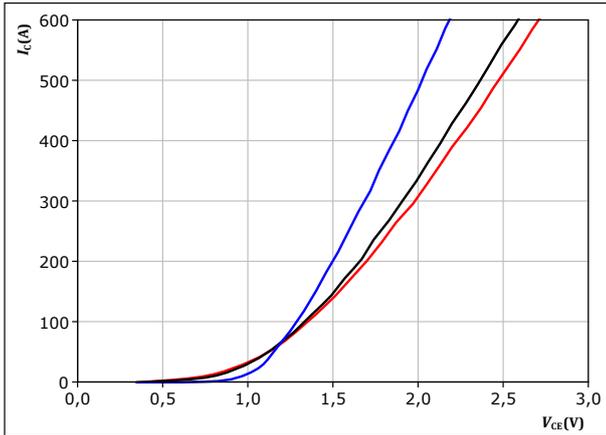


AC 1 Switch L Characteristics

figure 1. IGBT

Typical output characteristics

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



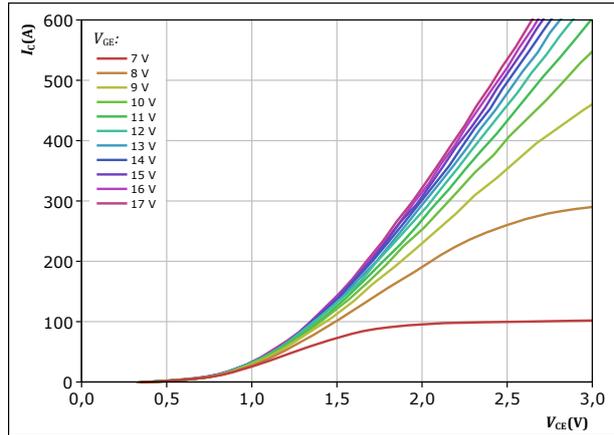
$t_p = 250\ \mu\text{s}$
 $V_{GE} = 15\ \text{V}$

$T_j:$ — 25 °C
— 125 °C
— 150 °C

figure 2. IGBT

Typical output characteristics

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

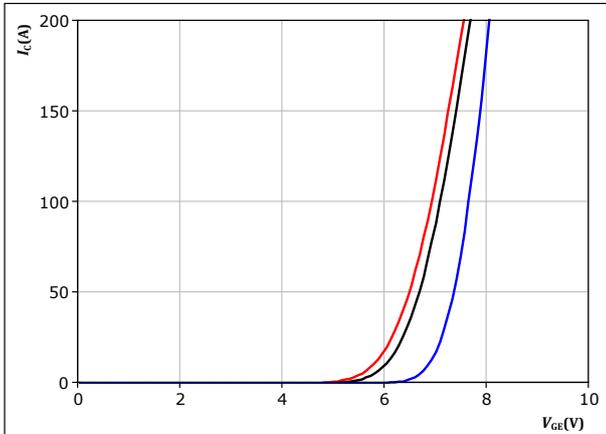


$t_p = 250\ \mu\text{s}$
 $T_j = 150\text{ °C}$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

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



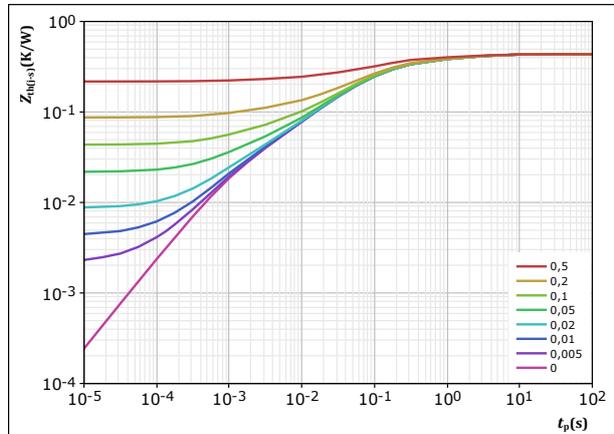
$t_p = 250\ \mu\text{s}$
 $V_{CE} = 10\ \text{V}$

$T_j:$ — 25 °C
— 125 °C
— 150 °C

figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,434\ \text{K/W}$

IGBT thermal model values

R (K/W)	τ (s)
4,93E-02	3,24E+00
8,20E-02	5,53E-01
2,21E-01	8,77E-02
6,21E-02	1,34E-02
2,00E-02	1,18E-03

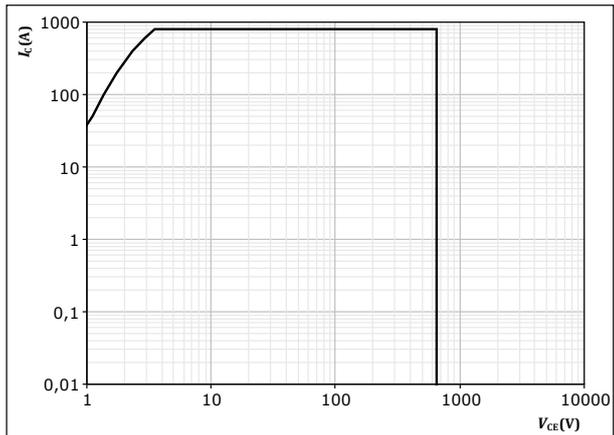


AC 1 Switch L Characteristics

figure 5. IGBT

Safe operating area

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



$D = \text{single pulse}$
 $T_s = 80 \text{ } ^\circ\text{C}$
 $V_{GE} = 15 \text{ V}$
 $T_j = T_{jmax}$



AC 1 Diode L Characteristics

figure 6. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

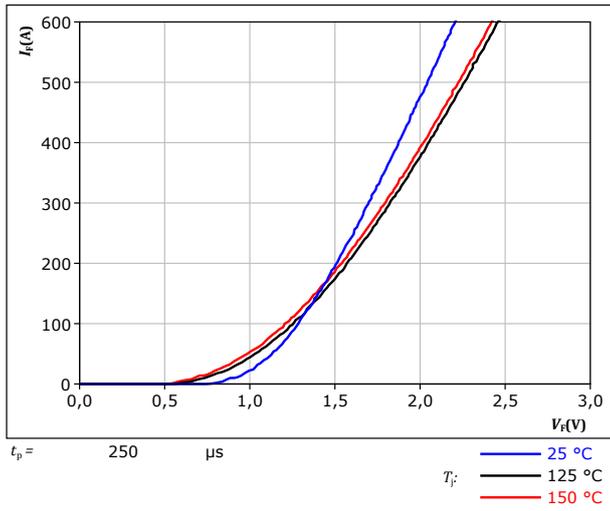
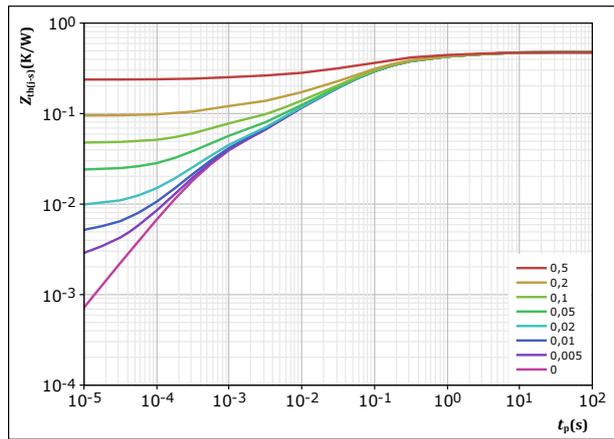


figure 7. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,475 \text{ K/W}$
 FWD thermal model values

R (K/W)	τ (s)
4,99E-02	3,52E+00
9,30E-02	4,57E-01
2,16E-01	7,66E-02
8,25E-02	9,31E-03
3,36E-02	5,55E-04

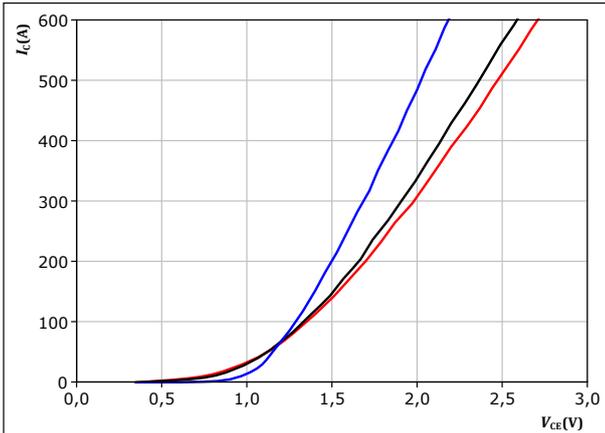


AC 1 Switch H Characteristics

figure 8. IGBT

Typical output characteristics

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



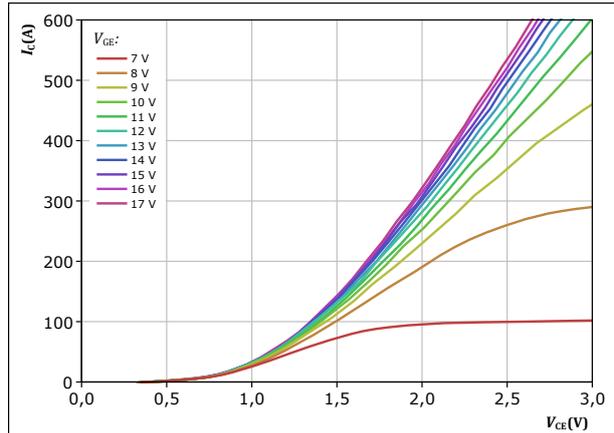
$t_p = 250 \mu s$
 $V_{GE} = 15 V$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 9. IGBT

Typical output characteristics

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

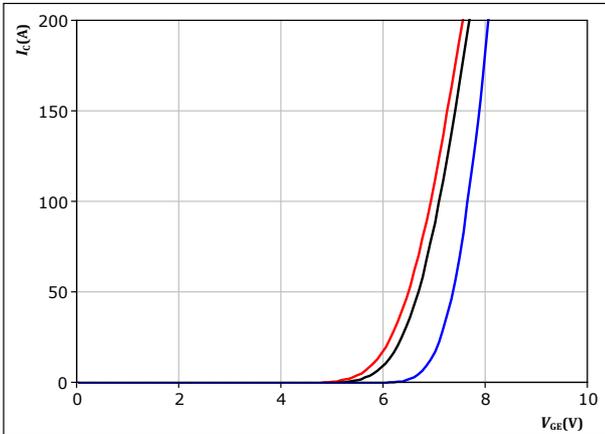


$t_p = 250 \mu s$
 $T_j = 150 \text{ }^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 10. IGBT

Typical transfer characteristics

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



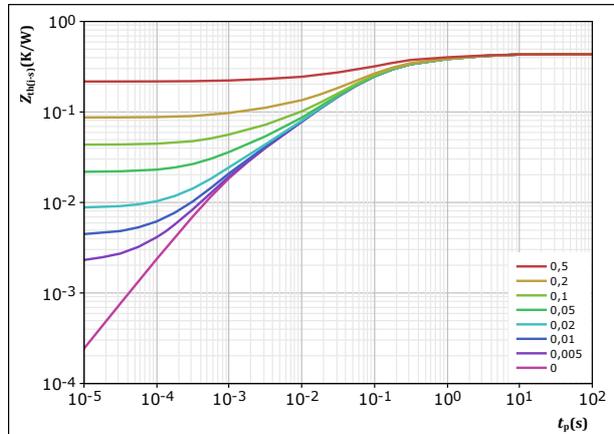
$t_p = 250 \mu s$
 $V_{CE} = 10 V$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 11. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,434 \text{ K/W}$

IGBT thermal model values

R (K/W)	τ (s)
4,93E-02	3,24E+00
8,20E-02	5,53E-01
2,21E-01	8,77E-02
6,21E-02	1,34E-02
2,00E-02	1,18E-03

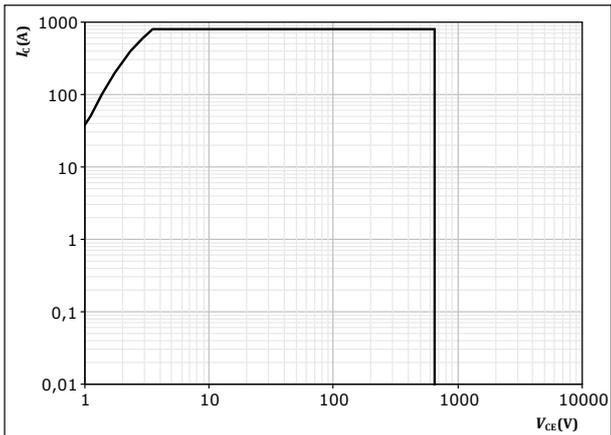


AC 1 Switch H Characteristics

figure 12. IGBT

Safe operating area

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



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



AC 1 Diode H Characteristics

figure 13. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

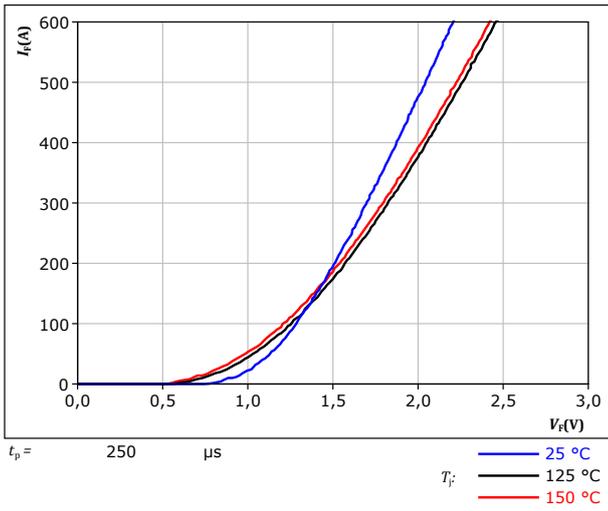
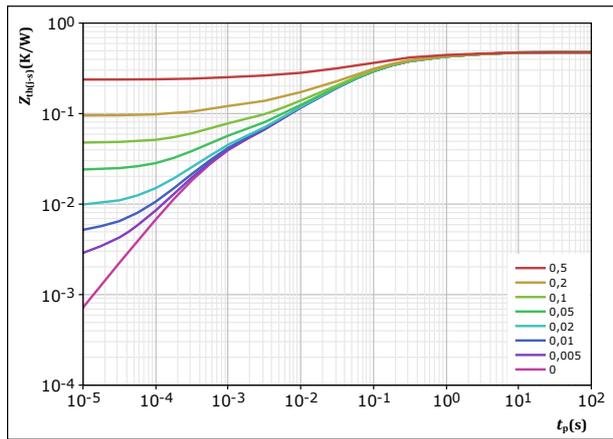


figure 14. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,475 \text{ K/W}$
 FWD thermal model values

R (K/W)	τ (s)
4,99E-02	3,52E+00
9,30E-02	4,57E-01
2,16E-01	7,66E-02
8,25E-02	9,31E-03
3,36E-02	5,55E-04

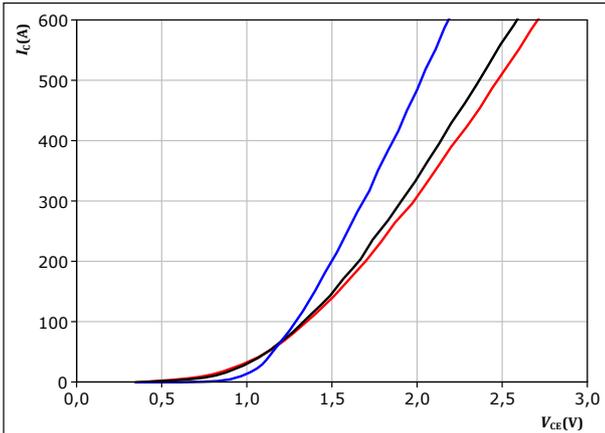


AC 2 Switch L Characteristics

figure 15. IGBT

Typical output characteristics

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



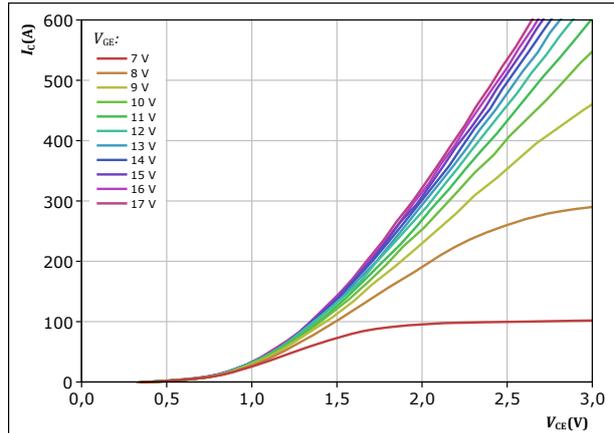
$t_p = 250 \mu s$
 $V_{GE} = 15 V$

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

figure 16. IGBT

Typical output characteristics

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

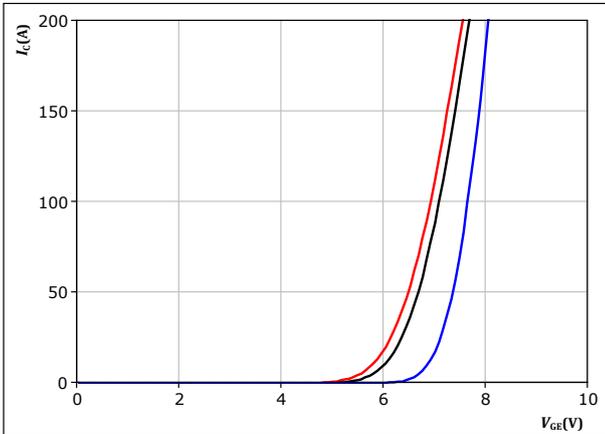


$t_p = 250 \mu s$
 $T_j = 150 \text{ °C}$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 17. IGBT

Typical transfer characteristics

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



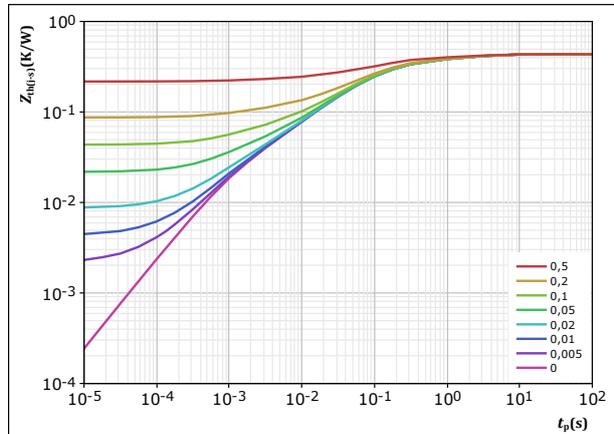
$t_p = 250 \mu s$
 $V_{CE} = 10 V$

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

figure 18. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,434 \text{ K/W}$

IGBT thermal model values

R (K/W)	τ (s)
4,93E-02	3,24E+00
8,20E-02	5,53E-01
2,21E-01	8,77E-02
6,21E-02	1,34E-02
2,00E-02	1,18E-03

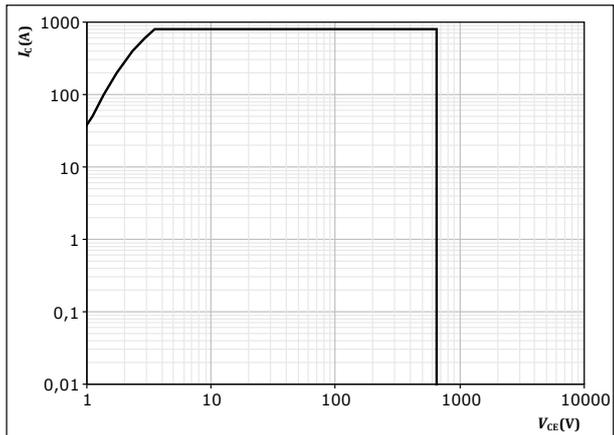


AC 2 Switch L Characteristics

figure 19. IGBT

Safe operating area

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



$D =$ single pulse
 $T_s = 80 \text{ } ^\circ\text{C}$
 $V_{GE} = 15 \text{ V}$
 $T_j = T_{jmax}$



AC 2 Diode L Characteristics

figure 20. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

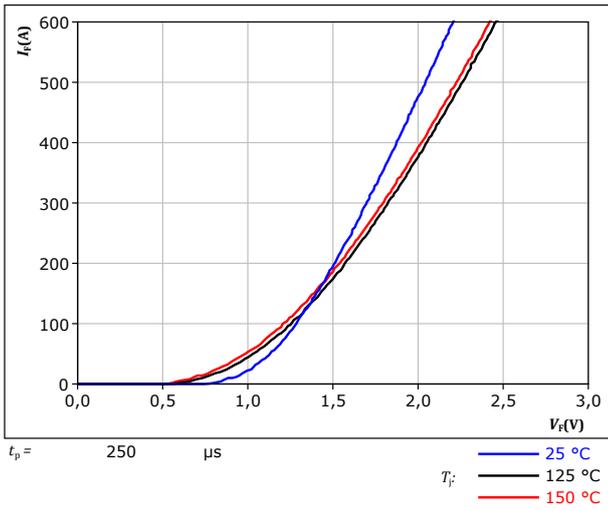
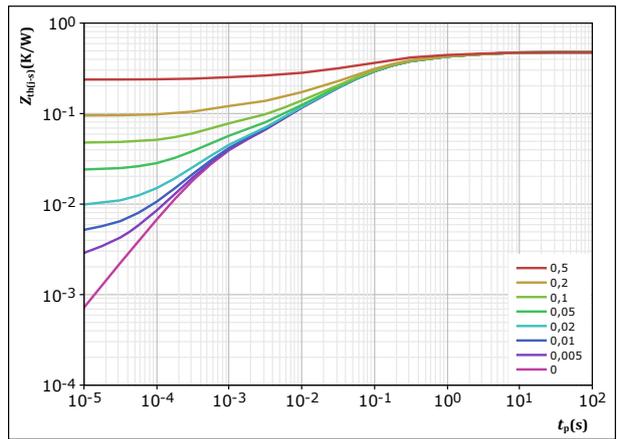


figure 21. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,475 \text{ K/W}$
 FWD thermal model values

R (K/W)	τ (s)
4,99E-02	3,52E+00
9,30E-02	4,57E-01
2,16E-01	7,66E-02
8,25E-02	9,31E-03
3,36E-02	5,55E-04

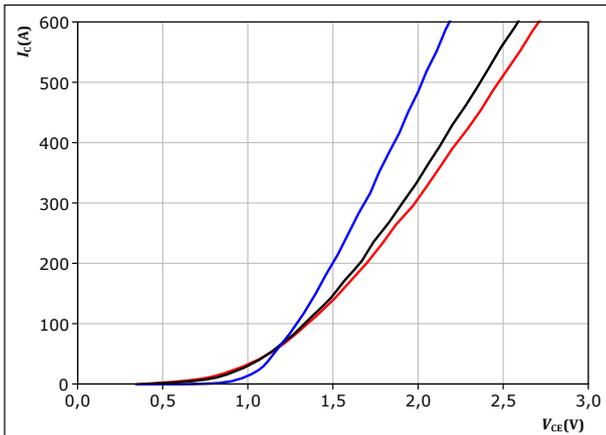


AC 2 Switch H Characteristics

figure 22. IGBT

Typical output characteristics

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



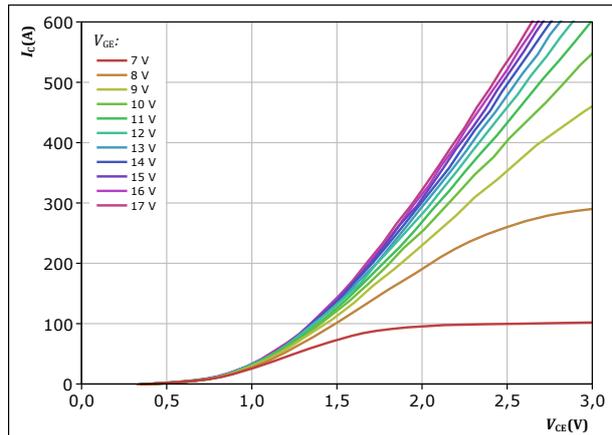
$t_p = 250\ \mu\text{s}$
 $V_{GE} = 15\ \text{V}$

$T_j:$ — 25 °C
— 125 °C
— 150 °C

figure 23. IGBT

Typical output characteristics

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

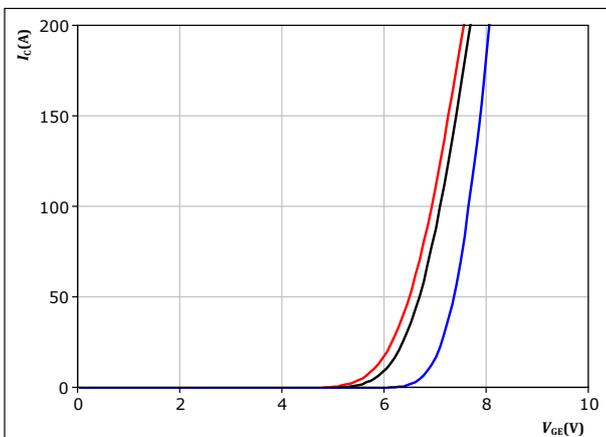


$t_p = 250\ \mu\text{s}$
 $T_j = 150\text{ °C}$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 24. IGBT

Typical transfer characteristics

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



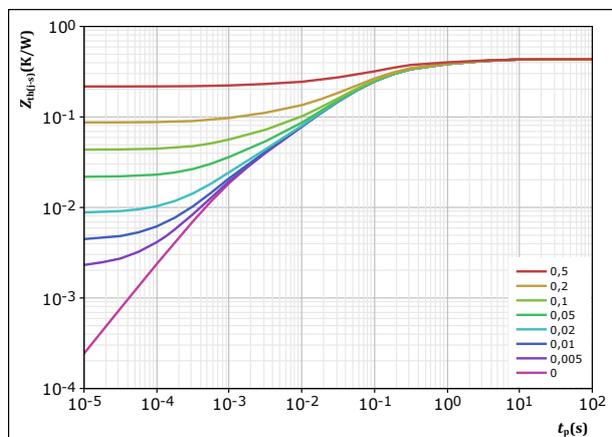
$t_p = 250\ \mu\text{s}$
 $V_{CE} = 10\ \text{V}$

$T_j:$ — 25 °C
— 125 °C
— 150 °C

figure 25. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,434\ \text{K/W}$

IGBT thermal model values

R (K/W)	τ (s)
4,93E-02	3,24E+00
8,20E-02	5,53E-01
2,21E-01	8,77E-02
6,21E-02	1,34E-02
2,00E-02	1,18E-03

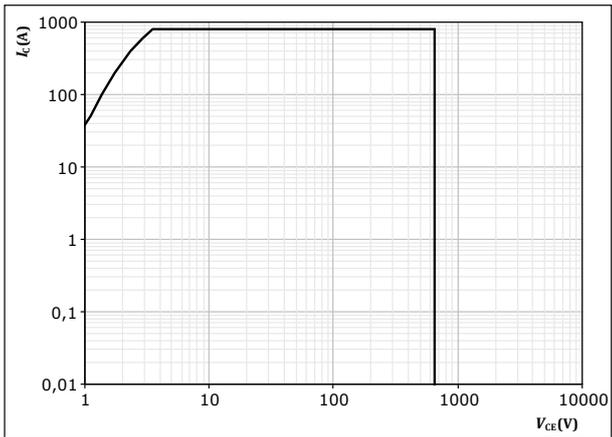


AC 2 Switch H Characteristics

figure 26. IGBT

Safe operating area

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



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



AC 2 Diode H Characteristics

figure 27. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

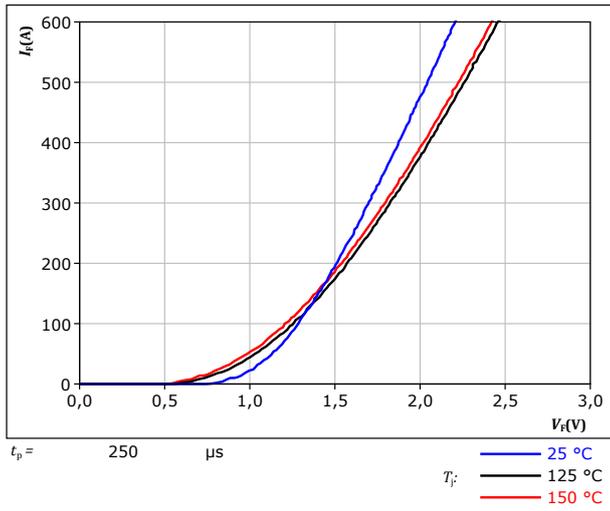
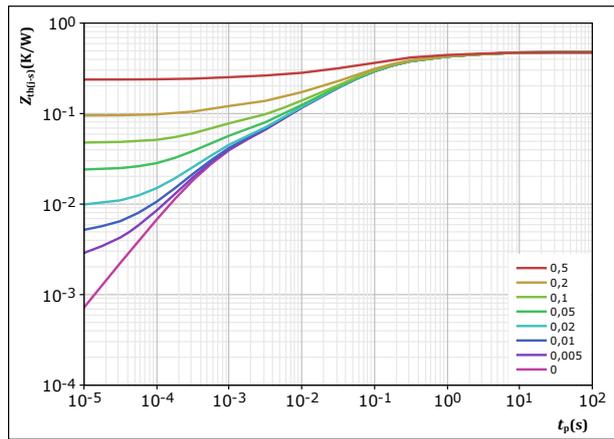


figure 28. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,475 \text{ K/W}$
 FWD thermal model values

R (K/W)	τ (s)
4,99E-02	3,52E+00
9,30E-02	4,57E-01
2,16E-01	7,66E-02
8,25E-02	9,31E-03
3,36E-02	5,55E-04

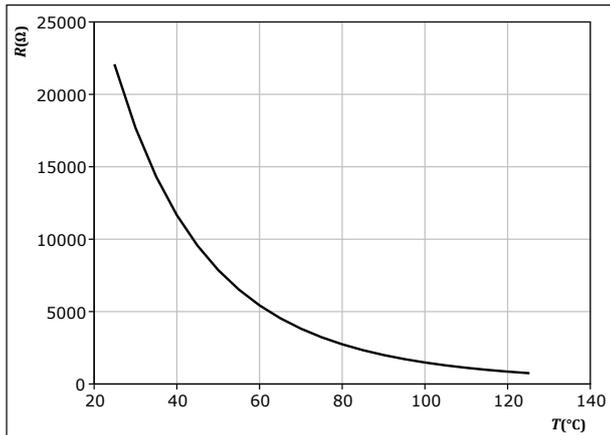


Thermistor Characteristics

figure 29. Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$

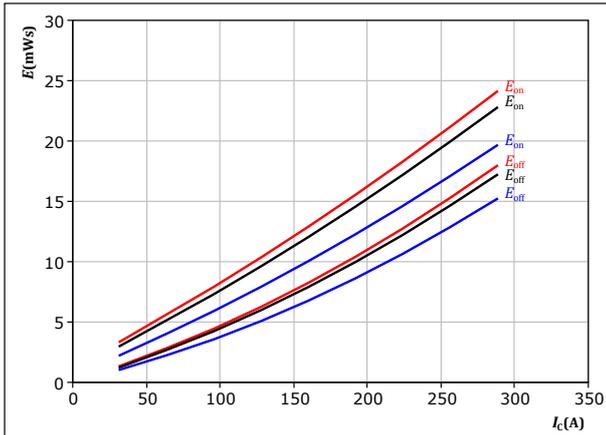




AC 1 Switching Characteristics L

figure 30. IGBT

Typical switching energy losses as a function of collector current
 $E = f(I_c)$

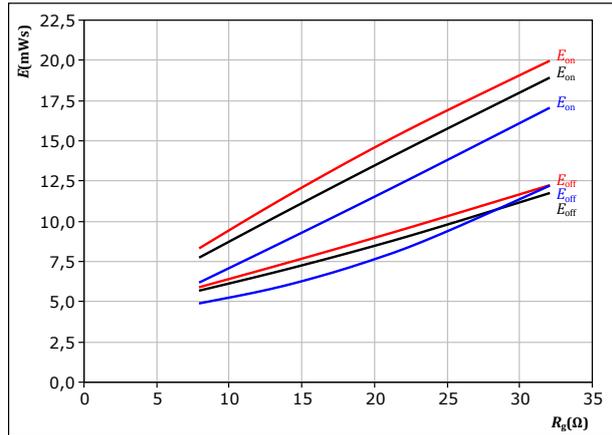


With an inductive load at
 $V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $R_{gon} = 16 \ \Omega$
 $R_{goff} = 16 \ \Omega$

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 31. IGBT

Typical switching energy losses as a function of gate resistor
 $E = f(R_g)$

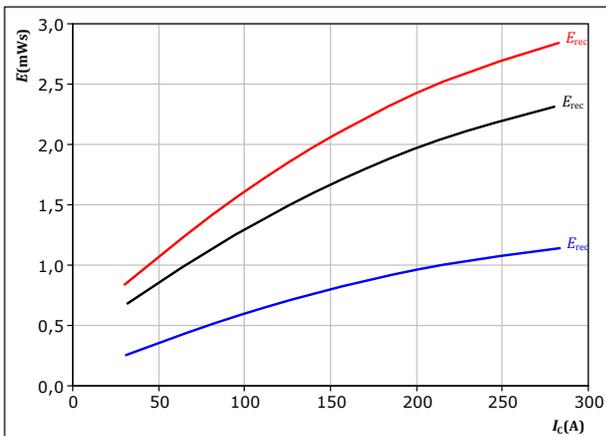


With an inductive load at
 $V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $I_c = 160 \text{ A}$

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 32. FWD

Typical reverse recovered energy loss as a function of collector current
 $E_{rec} = f(I_c)$

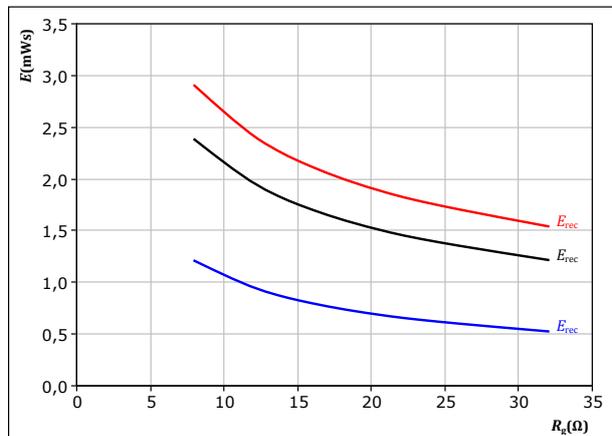


With an inductive load at
 $V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $R_{gon} = 16 \ \Omega$

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 33. FWD

Typical reverse recovered energy loss as a function of gate resistor
 $E_{rec} = f(R_g)$



With an inductive load at
 $V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $I_c = 160 \text{ A}$

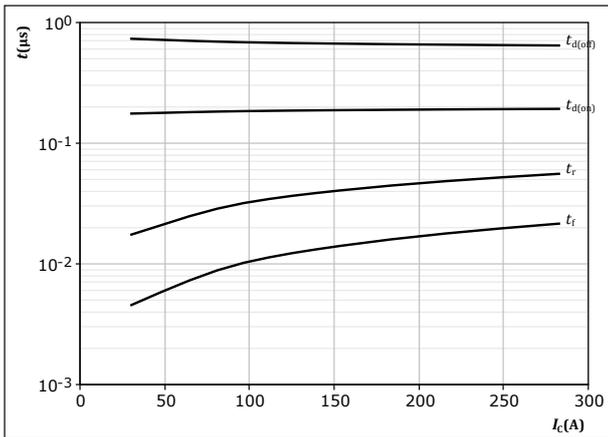
T_j : — 25 °C
 — 125 °C
 — 150 °C



AC 1 Switching Characteristics L

figure 34. IGBT

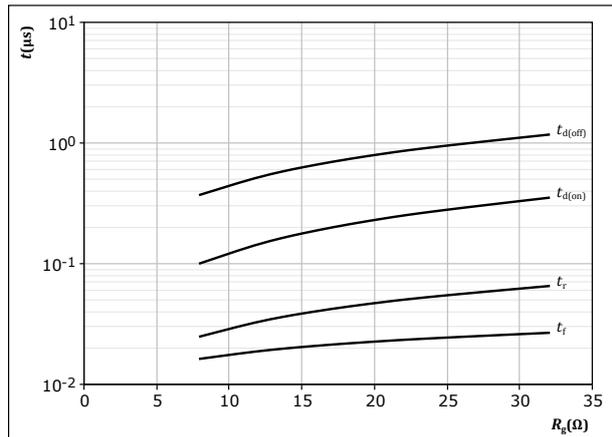
Typical switching times as a function of collector current
 $t = f(I_c)$



With an inductive load at
 $T_j = 150 \text{ }^\circ\text{C}$
 $V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $R_{gon} = 16 \text{ } \Omega$
 $R_{goff} = 16 \text{ } \Omega$

figure 35. IGBT

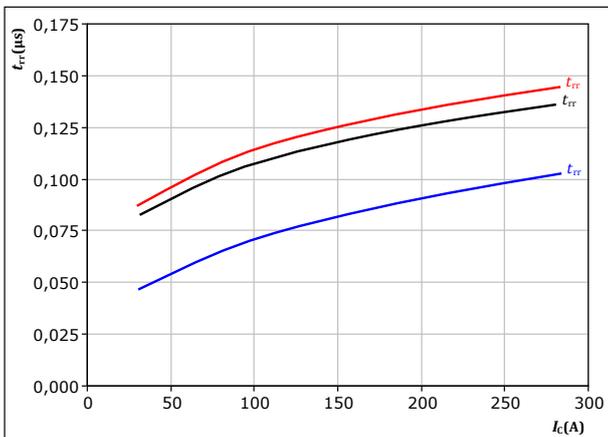
Typical switching times as a function of gate resistor
 $t = f(R_g)$



With an inductive load at
 $T_j = 150 \text{ }^\circ\text{C}$
 $V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $I_c = 160 \text{ A}$

figure 36. FWD

Typical reverse recovery time as a function of collector current
 $t_{rr} = f(I_c)$

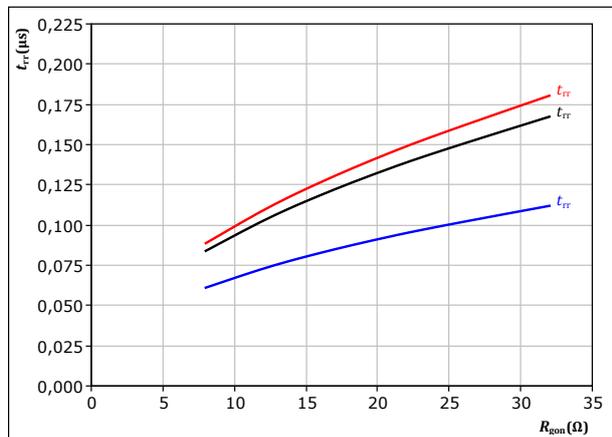


With an inductive load at
 $V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $R_{gon} = 16 \text{ } \Omega$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 37. FWD

Typical reverse recovery time as a function of IGBT turn on gate resistor
 $t_{rr} = f(R_{gon})$



With an inductive load at
 $V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $I_c = 160 \text{ A}$

T_j :
— 25 °C
— 125 °C
— 150 °C

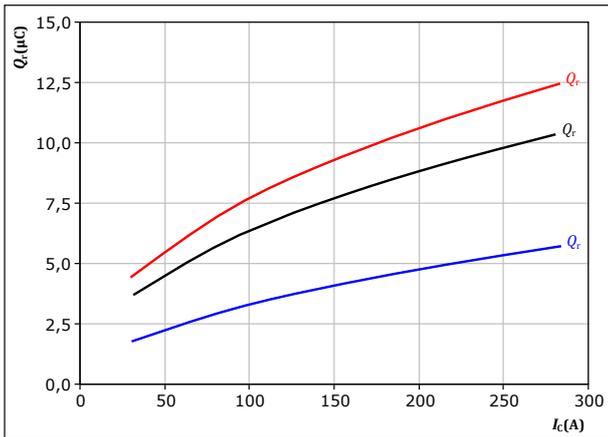


AC 1 Switching Characteristics L

figure 38. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

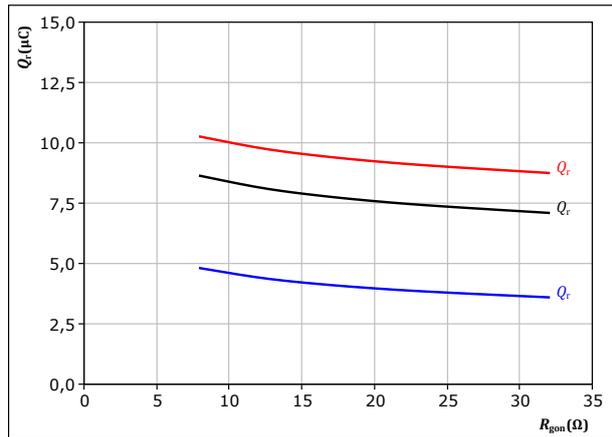
$V_{CE} = 600$ V
 $V_{GE} = -5/15$ V
 $R_{gon} = 16$ Ω

T_j : 25 °C
125 °C
150 °C

figure 39. FWD

Typical recovered charge as a function of turn on gate resistor

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



With an inductive load at

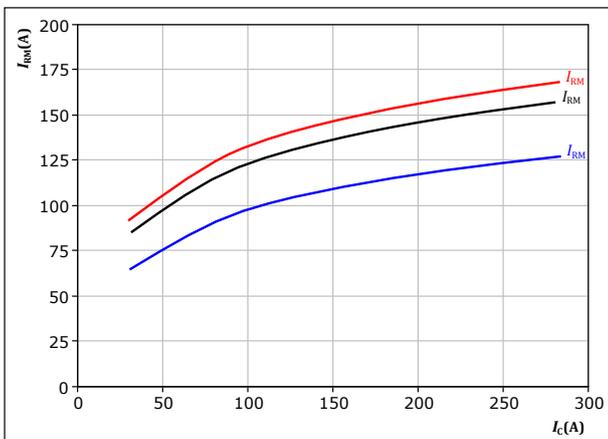
$V_{CE} = 600$ V
 $V_{GE} = -5/15$ V
 $I_c = 160$ A

T_j : 25 °C
125 °C
150 °C

figure 40. FWD

Typical peak reverse recovery current as a function of collector current

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



With an inductive load at

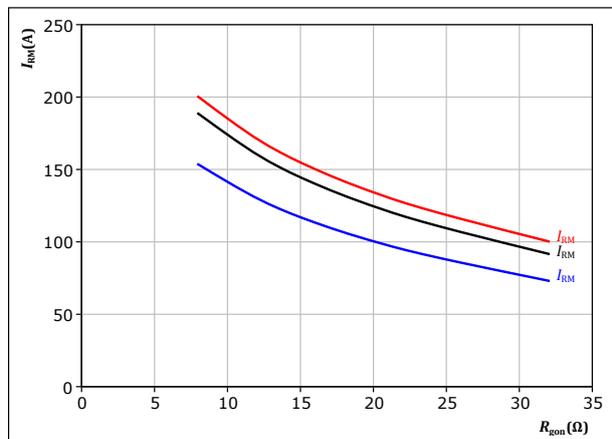
$V_{CE} = 600$ V
 $V_{GE} = -5/15$ V
 $R_{gon} = 16$ Ω

T_j : 25 °C
125 °C
150 °C

figure 41. FWD

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

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



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = -5/15$ V
 $I_c = 160$ A

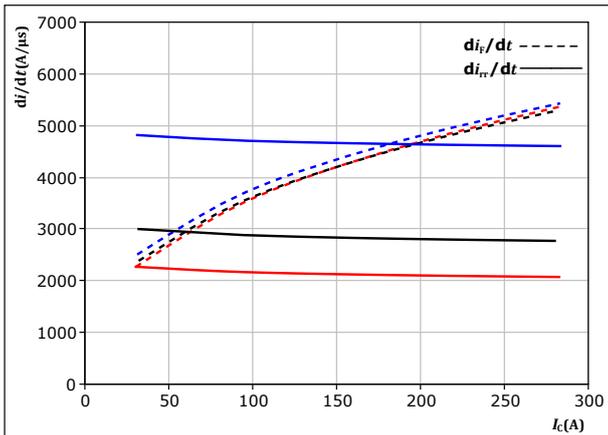
T_j : 25 °C
125 °C
150 °C



AC 1 Switching Characteristics L

figure 42. FWD

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



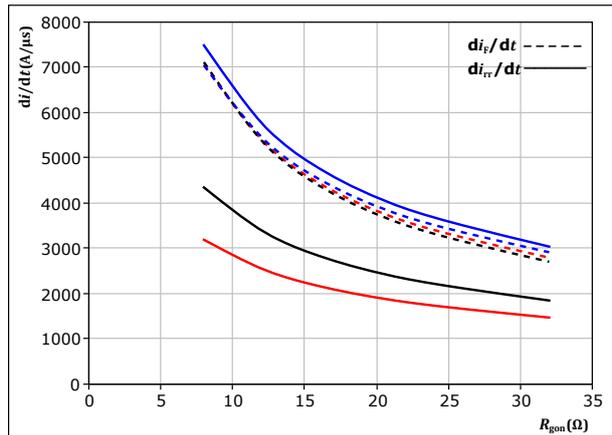
With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $R_{gon} = 16 \text{ } \Omega$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 43. FWD

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



With an inductive load at

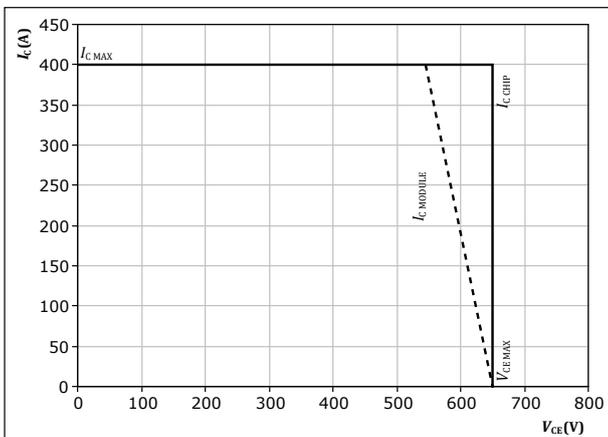
$V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $I_c = 160 \text{ A}$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 44. IGBT

Reverse bias safe operating area

$I_c = f(V_{CE})$



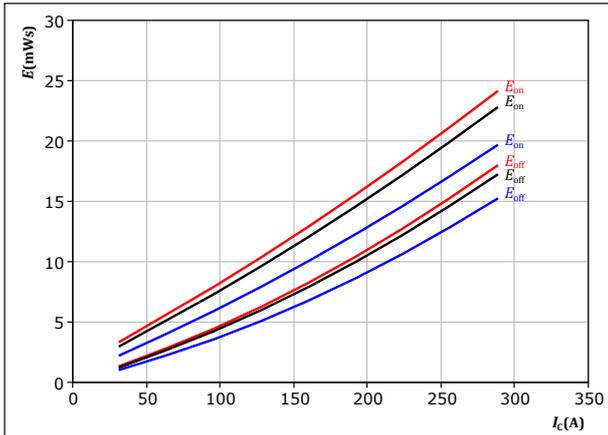
At $T_j = 150 \text{ } ^\circ\text{C}$
 $R_{gon} = 16 \text{ } \Omega$
 $R_{goff} = 16 \text{ } \Omega$



AC 1 Switching Characteristics H

figure 45. IGBT

Typical switching energy losses as a function of collector current
 $E = f(I_c)$

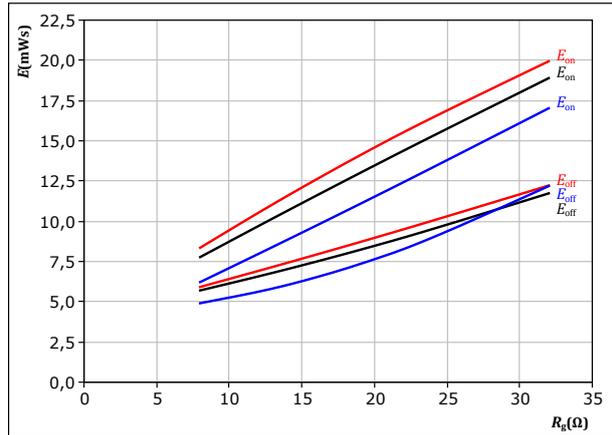


With an inductive load at

$V_{CE} = 600$ V	$T_j:$ 25 °C
$V_{GE} = -5/15$ V	125 °C
$R_{gon} = 16$ Ω	150 °C
$R_{goff} = 16$ Ω	

figure 46. IGBT

Typical switching energy losses as a function of gate resistor
 $E = f(R_g)$

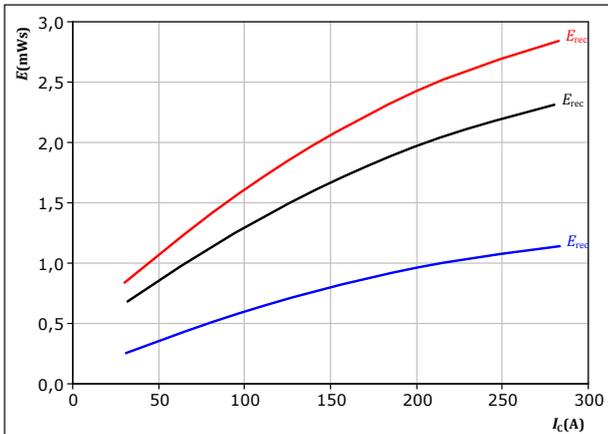


With an inductive load at

$V_{CE} = 600$ V	$T_j:$ 25 °C
$V_{GE} = -5/15$ V	125 °C
$I_c = 160$ A	150 °C

figure 47. FWD

Typical reverse recovered energy loss as a function of collector current
 $E_{rec} = f(I_c)$

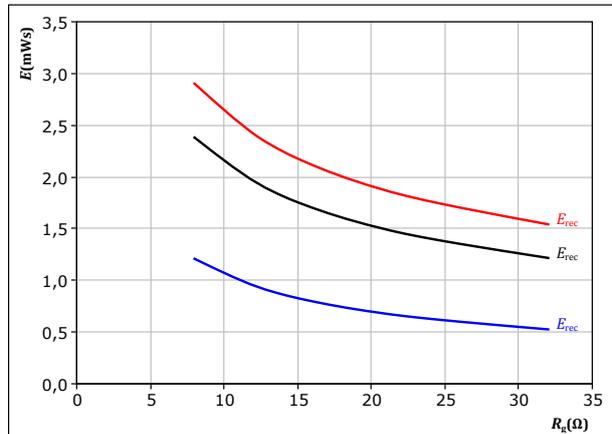


With an inductive load at

$V_{CE} = 600$ V	$T_j:$ 25 °C
$V_{GE} = -5/15$ V	125 °C
$R_{gon} = 16$ Ω	150 °C

figure 48. FWD

Typical reverse recovered energy loss as a function of gate resistor
 $E_{rec} = f(R_g)$



With an inductive load at

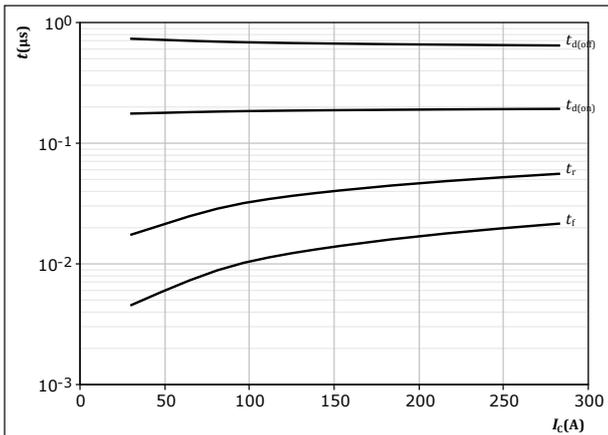
$V_{CE} = 600$ V	$T_j:$ 25 °C
$V_{GE} = -5/15$ V	125 °C
$I_c = 160$ A	150 °C



AC 1 Switching Characteristics H

figure 49. IGBT

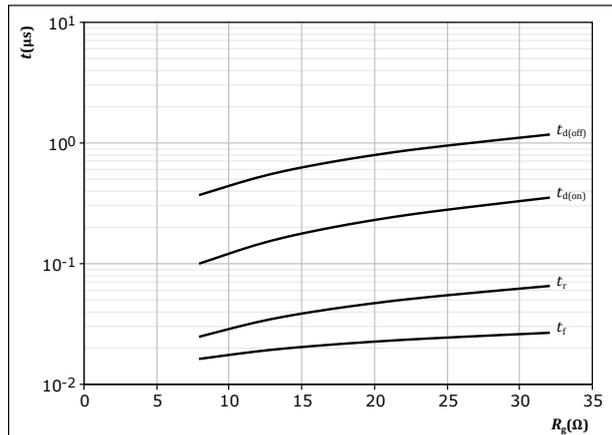
Typical switching times as a function of collector current
 $t = f(I_c)$



With an inductive load at
 $T_j = 150 \text{ }^\circ\text{C}$
 $V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $R_{gon} = 16 \text{ } \Omega$
 $R_{goff} = 16 \text{ } \Omega$

figure 50. IGBT

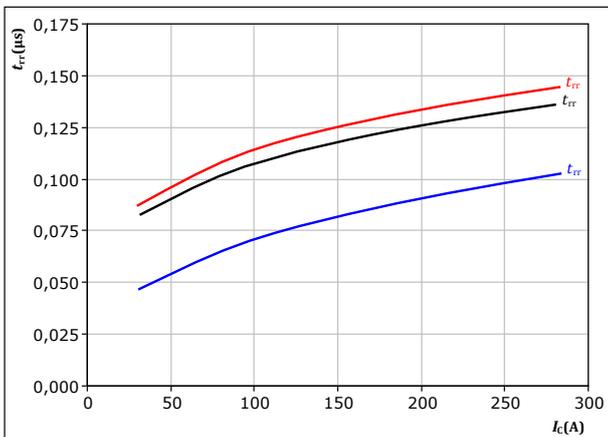
Typical switching times as a function of gate resistor
 $t = f(R_g)$



With an inductive load at
 $T_j = 150 \text{ }^\circ\text{C}$
 $V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $I_c = 160 \text{ A}$

figure 51. FWD

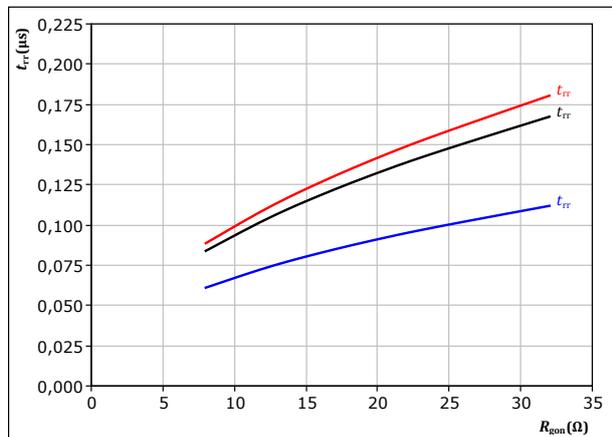
Typical reverse recovery time as a function of collector current
 $t_{rr} = f(I_c)$



With an inductive load at
 $V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $R_{gon} = 16 \text{ } \Omega$
 $T_j:$ — 25 °C
 — 125 °C
 — 150 °C

figure 52. FWD

Typical reverse recovery time as a function of IGBT turn on gate resistor
 $t_{rr} = f(R_{gon})$



With an inductive load at
 $V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $I_c = 160 \text{ A}$
 $T_j:$ — 25 °C
 — 125 °C
 — 150 °C

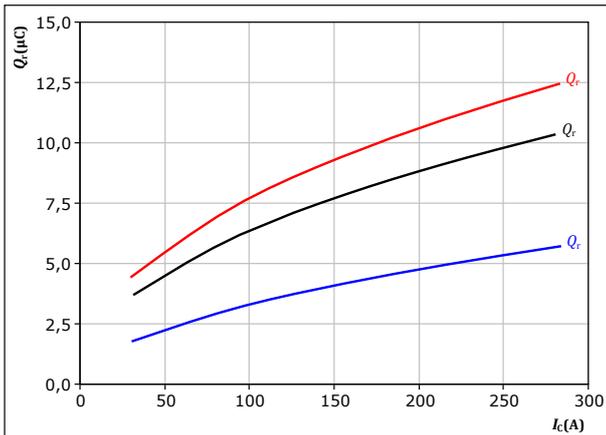


AC 1 Switching Characteristics H

figure 53. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

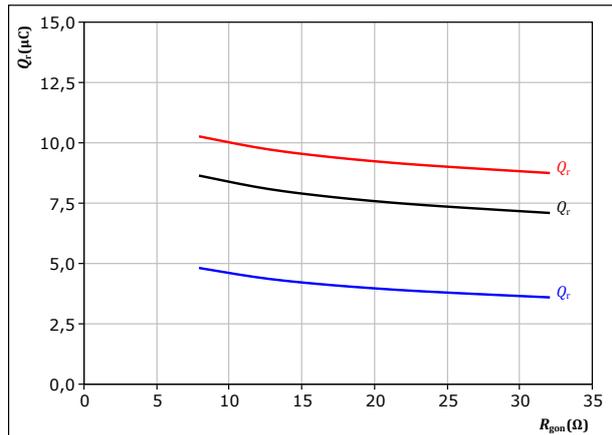
$V_{CE} = 600$ V
 $V_{GE} = -5/15$ V
 $R_{gon} = 16$ Ω

T_j : — 25 °C
— 125 °C
— 150 °C

figure 54. FWD

Typical recovered charge as a function of turn on gate resistor

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



With an inductive load at

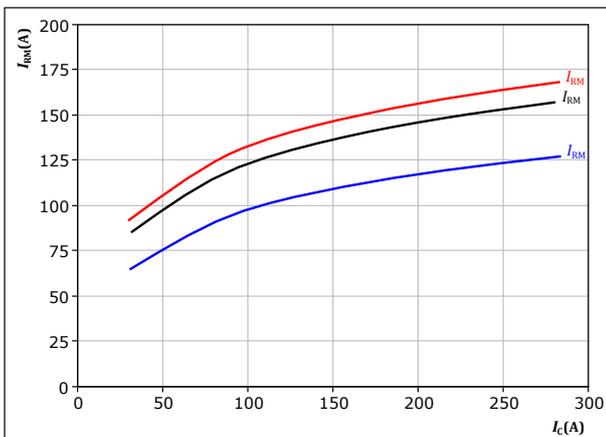
$V_{CE} = 600$ V
 $V_{GE} = -5/15$ V
 $I_c = 160$ A

T_j : — 25 °C
— 125 °C
— 150 °C

figure 55. FWD

Typical peak reverse recovery current as a function of collector current

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



With an inductive load at

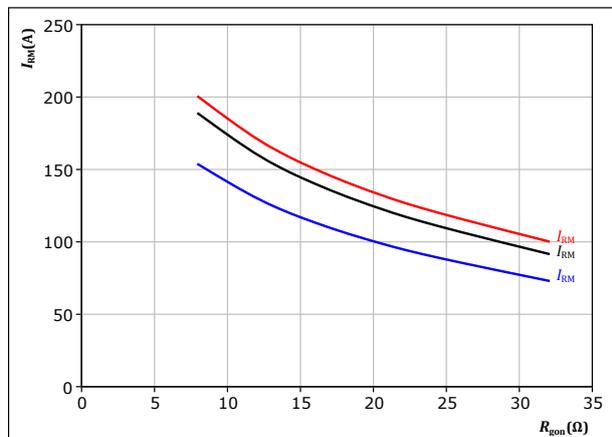
$V_{CE} = 600$ V
 $V_{GE} = -5/15$ V
 $R_{gon} = 16$ Ω

T_j : — 25 °C
— 125 °C
— 150 °C

figure 56. FWD

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

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



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = -5/15$ V
 $I_c = 160$ A

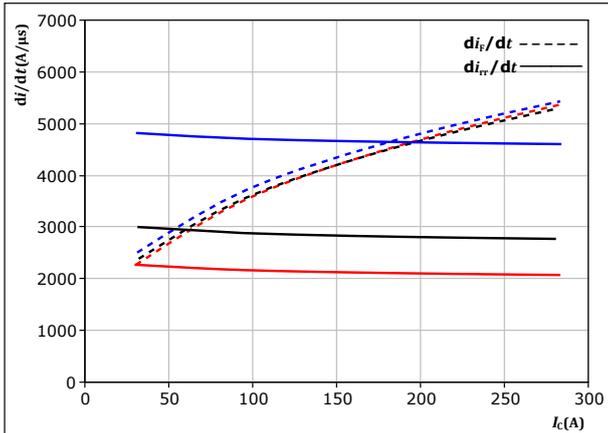
T_j : — 25 °C
— 125 °C
— 150 °C



AC 1 Switching Characteristics H

figure 57. FWD

Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_i/dt, di_r/dt = f(I_c)$

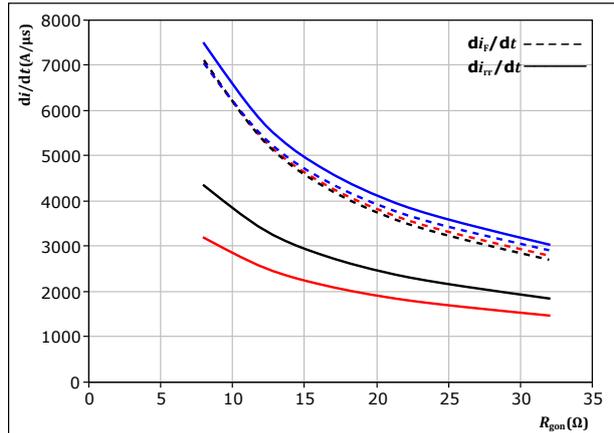


With an inductive load at

$V_{CE} =$	600	V	$T_j:$	25 °C
$V_{GE} =$	-5/15	V		125 °C
$R_{gon} =$	16	Ω		150 °C

figure 58. FWD

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



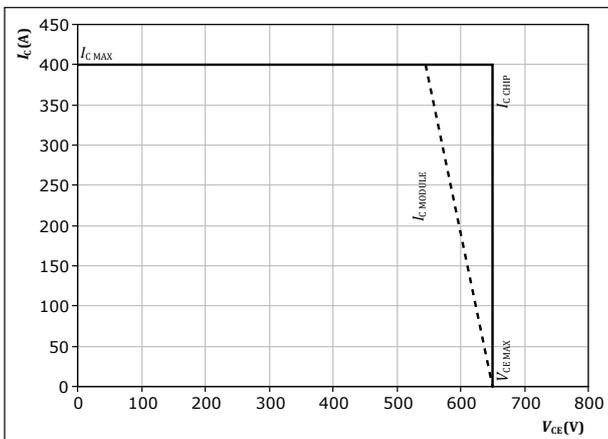
With an inductive load at

$V_{CE} =$	600	V	$T_j:$	25 °C
$V_{GE} =$	-5/15	V		125 °C
$I_c =$	160	A		150 °C

figure 59. IGBT

Reverse bias safe operating area

$I_c = f(V_{CE})$



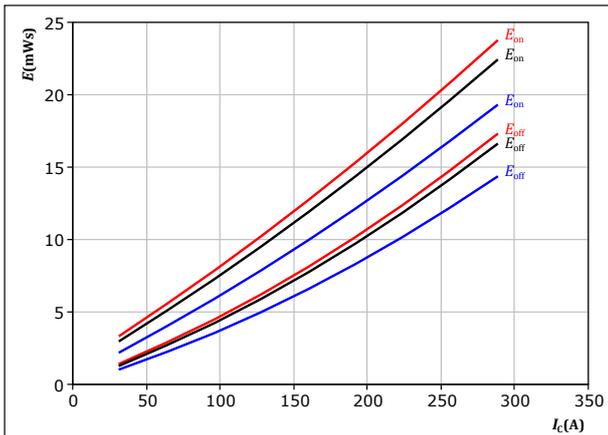
At $T_j = 150$ °C
 $R_{gon} = 16$ Ω
 $R_{goff} = 16$ Ω



AC 2 Switching Characteristics L

figure 60. IGBT

Typical switching energy losses as a function of collector current
 $E = f(I_c)$

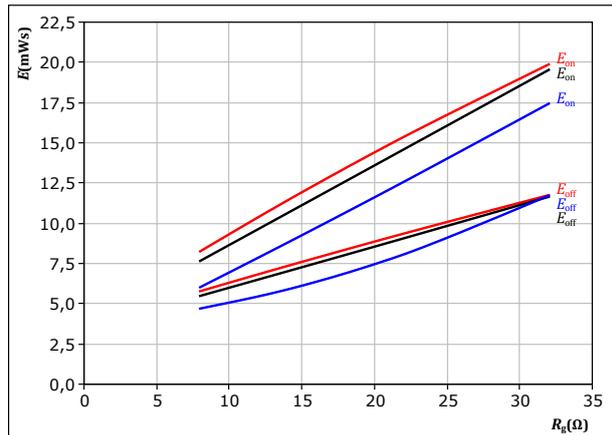


With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = -5/15$ V
 $R_{gon} = 16$ Ω
 $R_{goff} = 16$ Ω

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 61. IGBT

Typical switching energy losses as a function of gate resistor
 $E = f(R_g)$

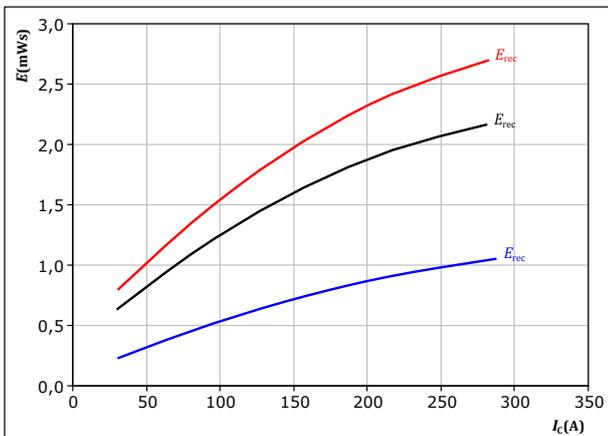


With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = -5/15$ V
 $I_c = 160$ A

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 62. FWD

Typical reverse recovered energy loss as a function of collector current
 $E_{rec} = f(I_c)$

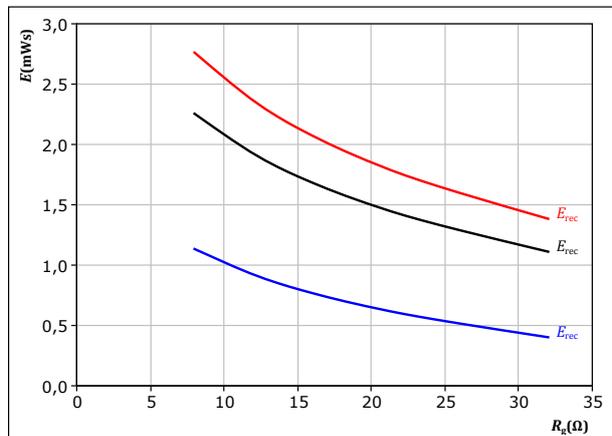


With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = -5/15$ V
 $R_{gon} = 16$ Ω

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 63. 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
 $V_{GE} = -5/15$ V
 $I_c = 160$ A

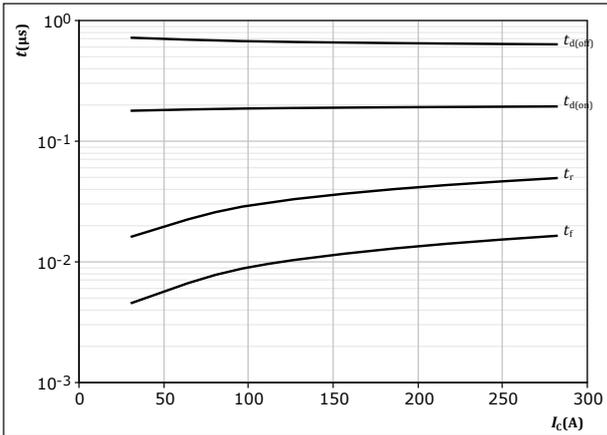
T_j : — 25 °C
 — 125 °C
 — 150 °C



AC 2 Switching Characteristics L

figure 64. IGBT

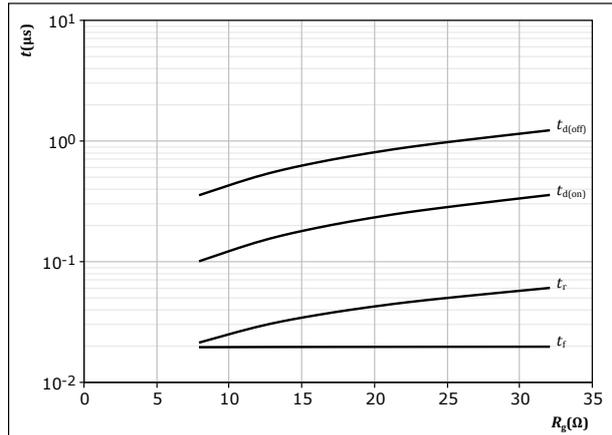
Typical switching times as a function of collector current
 $t = f(I_c)$



With an inductive load at
 $T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = -5/15$ V
 $R_{gon} = 16$ Ω
 $R_{goff} = 16$ Ω

figure 65. IGBT

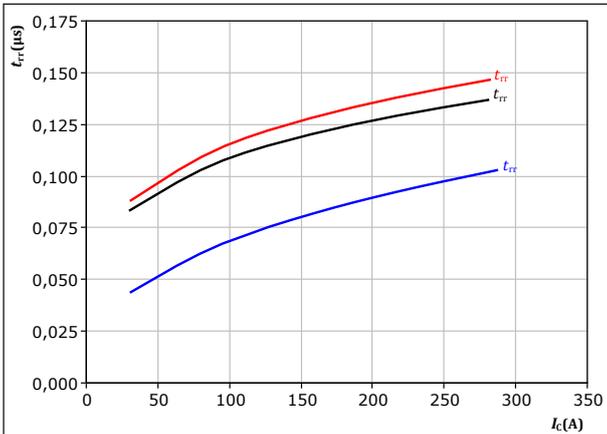
Typical switching times as a function of gate resistor
 $t = f(R_g)$



With an inductive load at
 $T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = -5/15$ V
 $I_c = 160$ A

figure 66. FWD

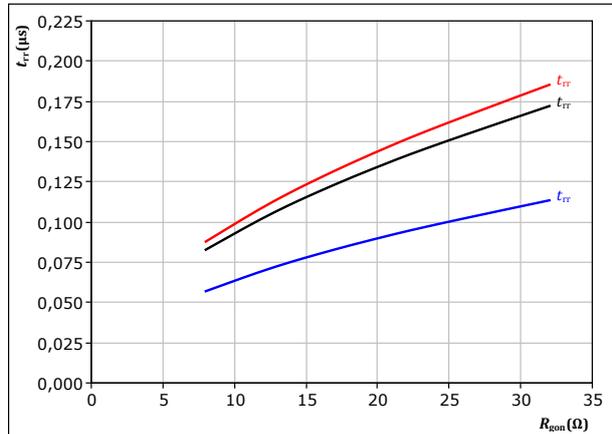
Typical reverse recovery time as a function of collector current
 $t_{rr} = f(I_c)$



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = -5/15$ V
 $R_{gon} = 16$ Ω
 T_j : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 67. FWD

Typical reverse recovery time as a function of IGBT turn on gate resistor
 $t_{rr} = f(R_{gon})$



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = -5/15$ V
 $I_c = 160$ A
 T_j : 25 °C (blue), 125 °C (black), 150 °C (red)

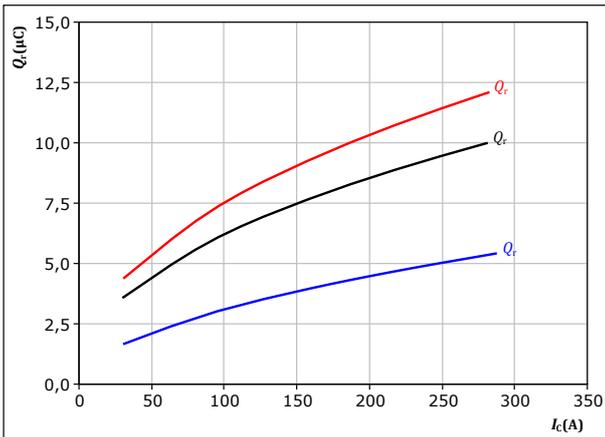


AC 2 Switching Characteristics L

figure 68. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



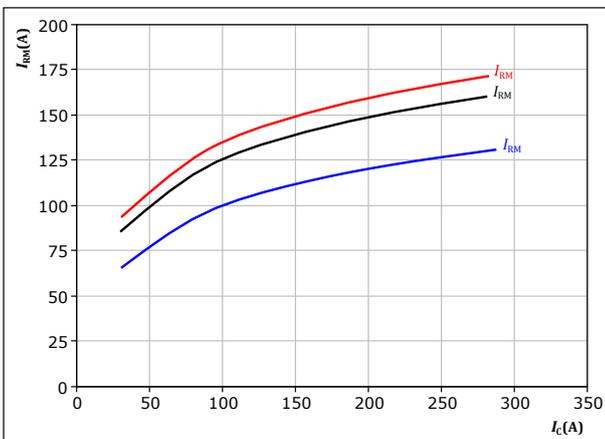
With an inductive load at

$V_{CE} =$	600	V	$T_j:$	25 °C
$V_{GE} =$	-5/15	V		125 °C
$R_{gon} =$	16	Ω		150 °C

figure 70. FWD

Typical peak reverse recovery current as a function of collector current

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



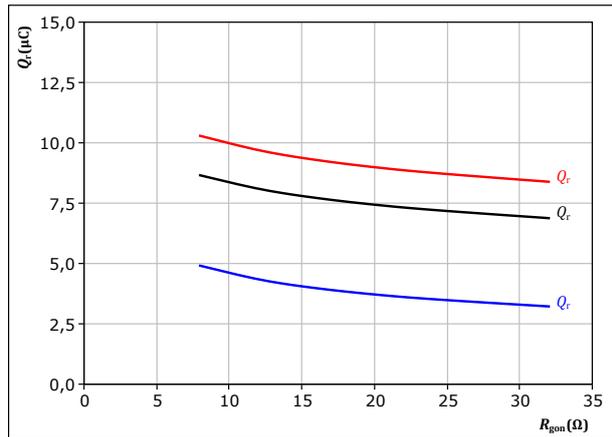
With an inductive load at

$V_{CE} =$	600	V	$T_j:$	25 °C
$V_{GE} =$	-5/15	V		125 °C
$R_{gon} =$	16	Ω		150 °C

figure 69. FWD

Typical recovered charge as a function of turn on gate resistor

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



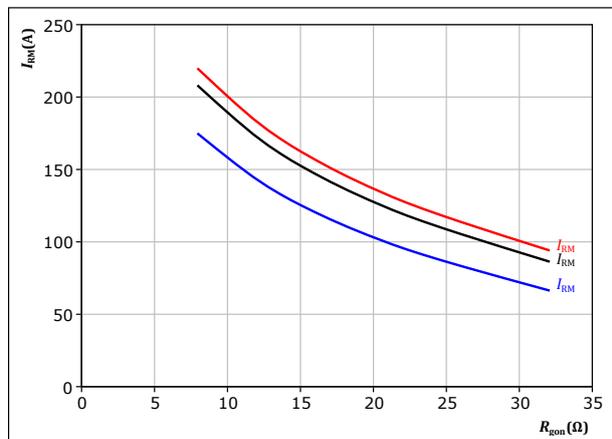
With an inductive load at

$V_{CE} =$	600	V	$T_j:$	25 °C
$V_{GE} =$	-5/15	V		125 °C
$I_c =$	160	A		150 °C

figure 71. FWD

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

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



With an inductive load at

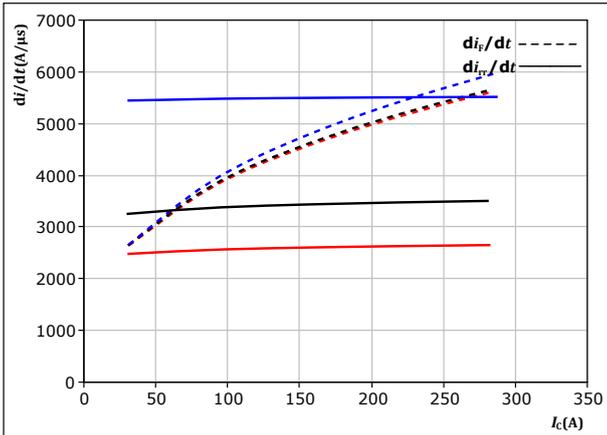
$V_{CE} =$	600	V	$T_j:$	25 °C
$V_{GE} =$	-5/15	V		125 °C
$I_c =$	160	A		150 °C



AC 2 Switching Characteristics L

figure 72. FWD

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



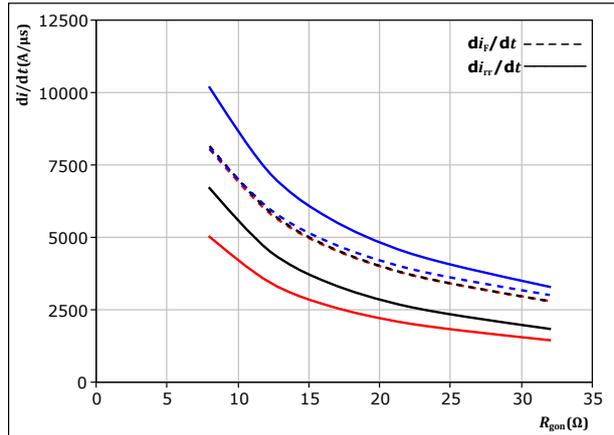
With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $R_{gon} = 16 \ \Omega$

T_j : 25 °C
 125 °C
 150 °C

figure 73. FWD

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



With an inductive load at

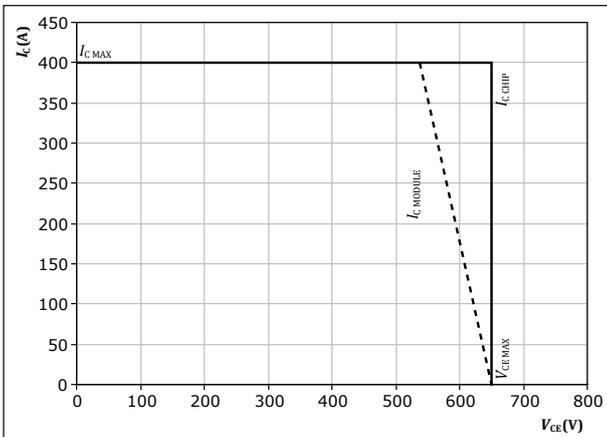
$V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $I_c = 160 \text{ A}$

T_j : 25 °C
 125 °C
 150 °C

figure 74. IGBT

Reverse bias safe operating area

$I_c = f(V_{CE})$



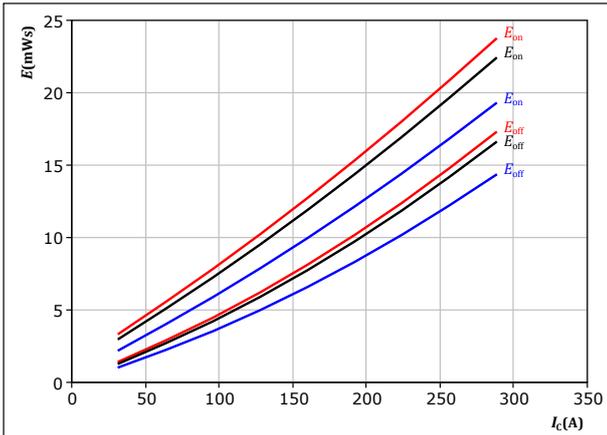
At $T_j = 150 \text{ °C}$
 $R_{gon} = 16 \ \Omega$
 $R_{goff} = 16 \ \Omega$



AC 2 Switching Characteristics H

figure 75. IGBT

Typical switching energy losses as a function of collector current
 $E = f(I_c)$

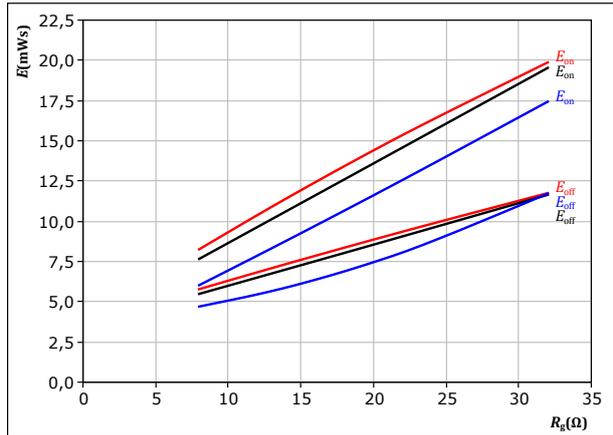


With an inductive load at

$V_{CE} = 600$ V	$T_j = 25$ °C
$V_{GE} = -5/15$ V	$T_j = 125$ °C
$R_{gon} = 16$ Ω	$T_j = 150$ °C
$R_{goff} = 16$ Ω	

figure 76. IGBT

Typical switching energy losses as a function of gate resistor
 $E = f(R_g)$

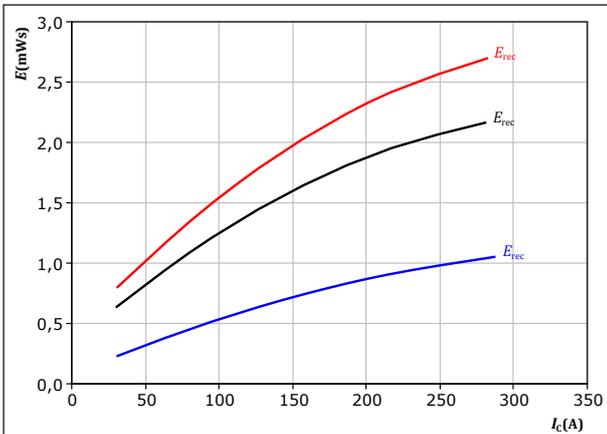


With an inductive load at

$V_{CE} = 600$ V	$T_j = 25$ °C
$V_{GE} = -5/15$ V	$T_j = 125$ °C
$I_c = 160$ A	$T_j = 150$ °C

figure 77. FWD

Typical reverse recovered energy loss as a function of collector current
 $E_{rec} = f(I_c)$

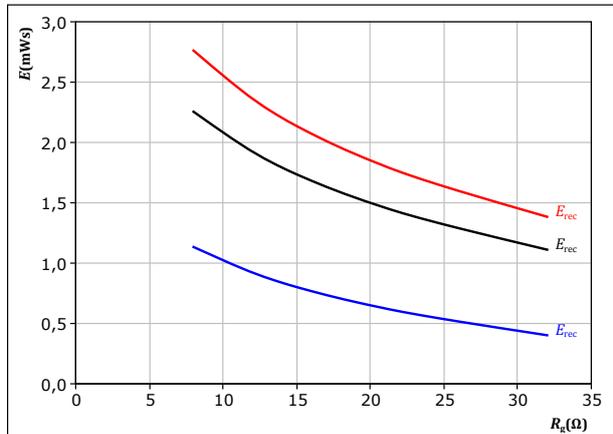


With an inductive load at

$V_{CE} = 600$ V	$T_j = 25$ °C
$V_{GE} = -5/15$ V	$T_j = 125$ °C
$R_{gon} = 16$ Ω	$T_j = 150$ °C

figure 78. FWD

Typical reverse recovered energy loss as a function of gate resistor
 $E_{rec} = f(R_g)$



With an inductive load at

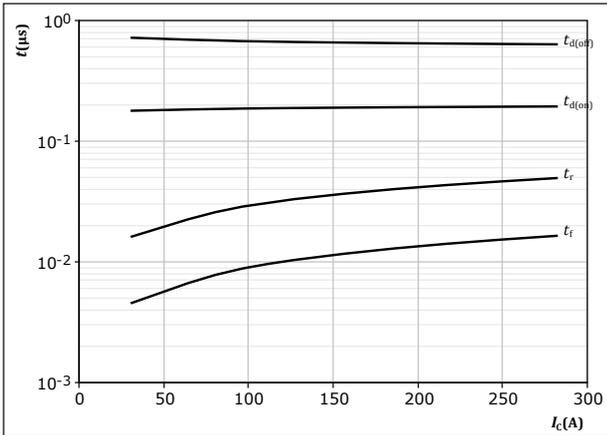
$V_{CE} = 600$ V	$T_j = 25$ °C
$V_{GE} = -5/15$ V	$T_j = 125$ °C
$I_c = 160$ A	$T_j = 150$ °C



AC 2 Switching Characteristics H

figure 79. IGBT

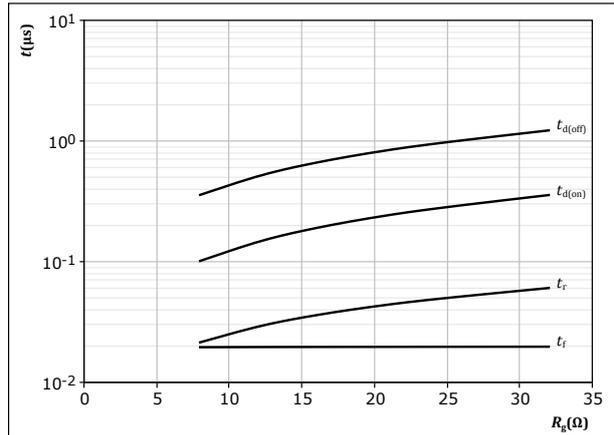
Typical switching times as a function of collector current
 $t = f(I_c)$



With an inductive load at
 $T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = -5/15$ V
 $R_{gon} = 16$ Ω
 $R_{goff} = 16$ Ω

figure 80. IGBT

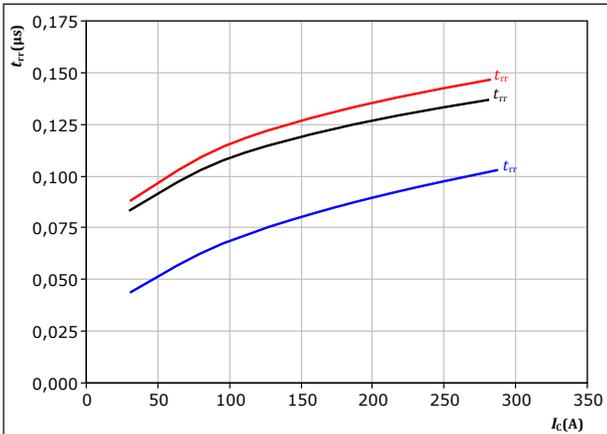
Typical switching times as a function of gate resistor
 $t = f(R_g)$



With an inductive load at
 $T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = -5/15$ V
 $I_c = 160$ A

figure 81. FWD

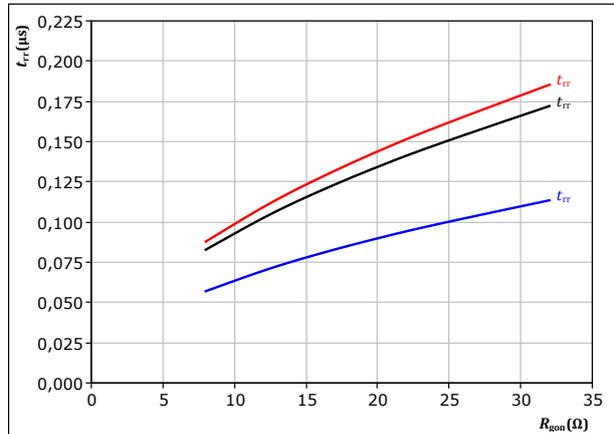
Typical reverse recovery time as a function of collector current
 $t_{rr} = f(I_c)$



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = -5/15$ V
 $R_{gon} = 16$ Ω
 T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 82. FWD

Typical reverse recovery time as a function of IGBT turn on gate resistor
 $t_{rr} = f(R_{gon})$



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = -5/15$ V
 $I_c = 160$ A
 T_j : — 25 °C
 — 125 °C
 — 150 °C

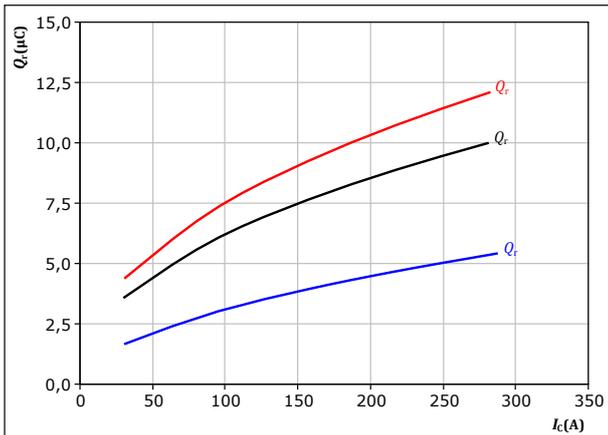


AC 2 Switching Characteristics H

figure 83. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

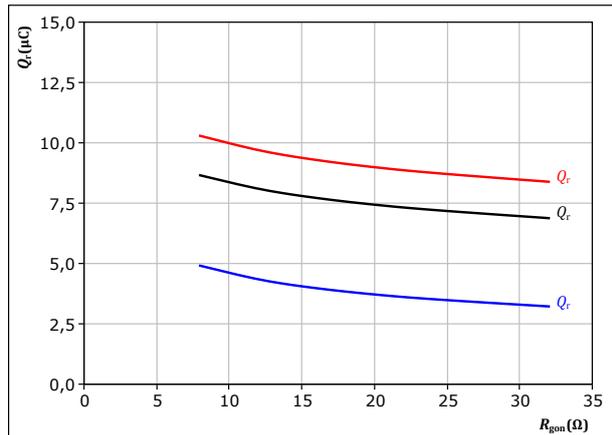
$V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $R_{gon} = 16 \ \Omega$

T_j : $25 \text{ }^\circ\text{C}$ (blue)
 $125 \text{ }^\circ\text{C}$ (black)
 $150 \text{ }^\circ\text{C}$ (red)

figure 84. FWD

Typical recovered charge as a function of turn on gate resistor

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



With an inductive load at

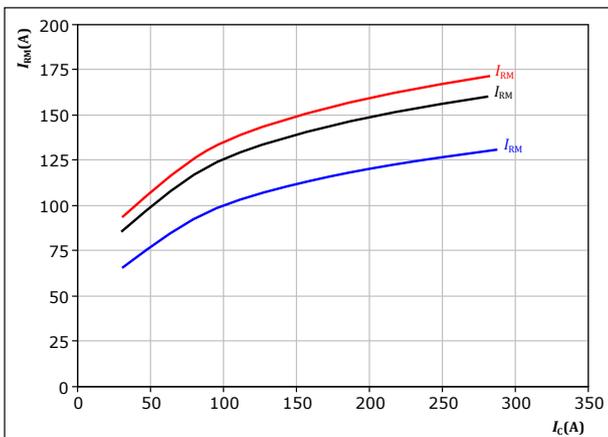
$V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $I_c = 160 \text{ A}$

T_j : $25 \text{ }^\circ\text{C}$ (blue)
 $125 \text{ }^\circ\text{C}$ (black)
 $150 \text{ }^\circ\text{C}$ (red)

figure 85. FWD

Typical peak reverse recovery current as a function of collector current

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



With an inductive load at

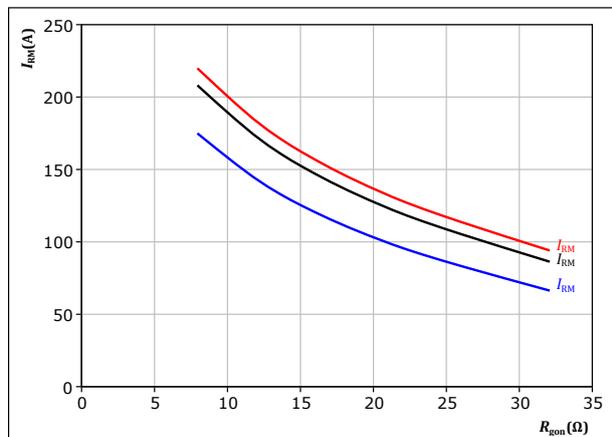
$V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $R_{gon} = 16 \ \Omega$

T_j : $25 \text{ }^\circ\text{C}$ (blue)
 $125 \text{ }^\circ\text{C}$ (black)
 $150 \text{ }^\circ\text{C}$ (red)

figure 86. FWD

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

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



With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $I_c = 160 \text{ A}$

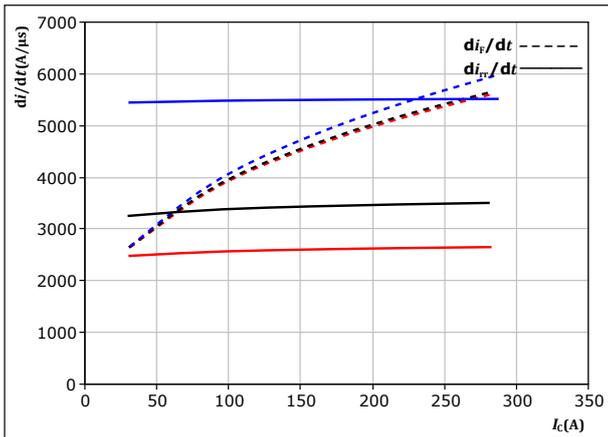
T_j : $25 \text{ }^\circ\text{C}$ (blue)
 $125 \text{ }^\circ\text{C}$ (black)
 $150 \text{ }^\circ\text{C}$ (red)



AC 2 Switching Characteristics H

figure 87. FWD

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



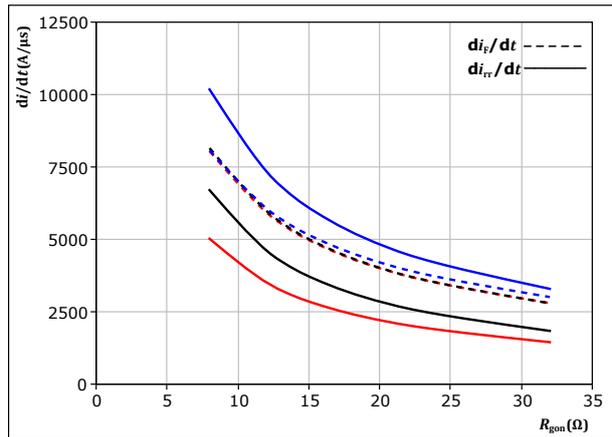
With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $R_{gon} = 16 \ \Omega$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 88. FWD

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



With an inductive load at

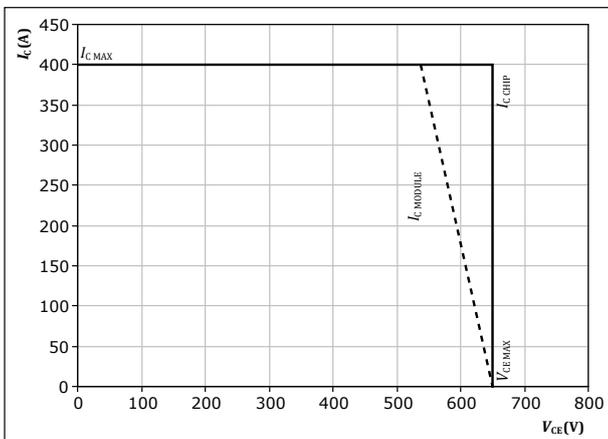
$V_{CE} = 600 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $I_c = 160 \text{ A}$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 89. IGBT

Reverse bias safe operating area

$I_c = f(V_{CE})$



At $T_j = 150 \text{ °C}$
 $R_{gon} = 16 \ \Omega$
 $R_{goff} = 16 \ \Omega$



Switching Definitions

figure 90. IGBT
Turn-off Switching Waveforms & definition of t_{doff} , t_{Eoff} (t_{Eoff} = integrating time for E_{off})

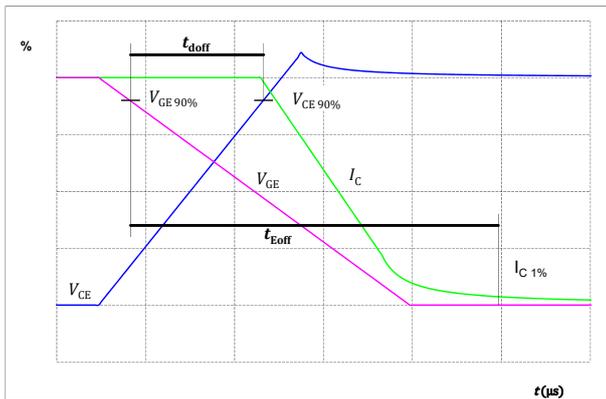


figure 91. IGBT
Turn-on Switching Waveforms & definition of t_{don} , t_{Eon} (t_{Eon} = integrating time for E_{on})

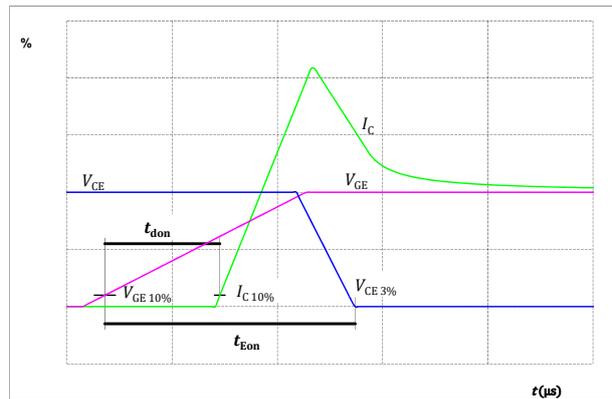


figure 92. IGBT
Turn-off Switching Waveforms & definition of t_f

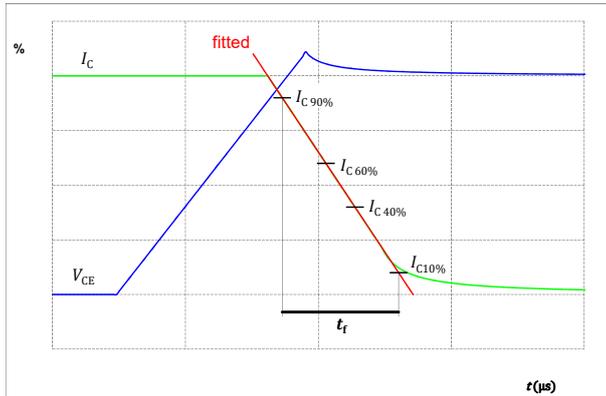
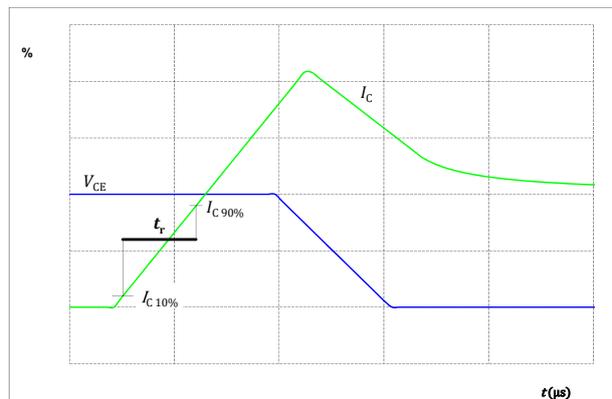


figure 93. IGBT
Turn-on Switching Waveforms & definition of t_r





Switching Definitions

figure 94. FWD

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

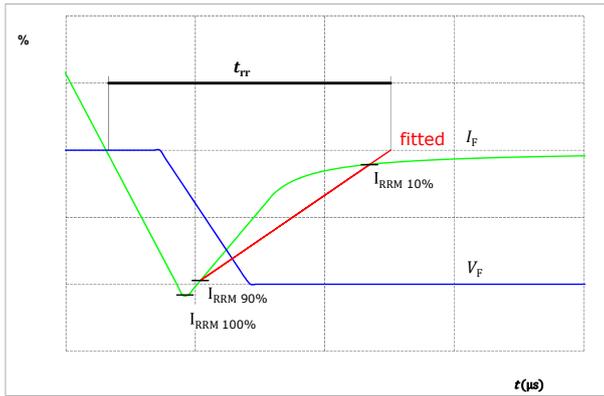
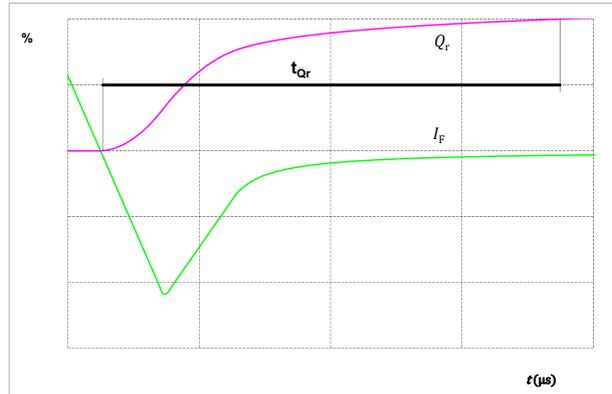


figure 95. FWD

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





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10-FY07FCA200RG-LQ45L60
datasheet

Ordering Code	
Version	Ordering Code
Without thermal paste	10-FY07FCA200RG-LQ45L60
With thermal paste	10-FY07FCA200RG-LQ45L60-/3/

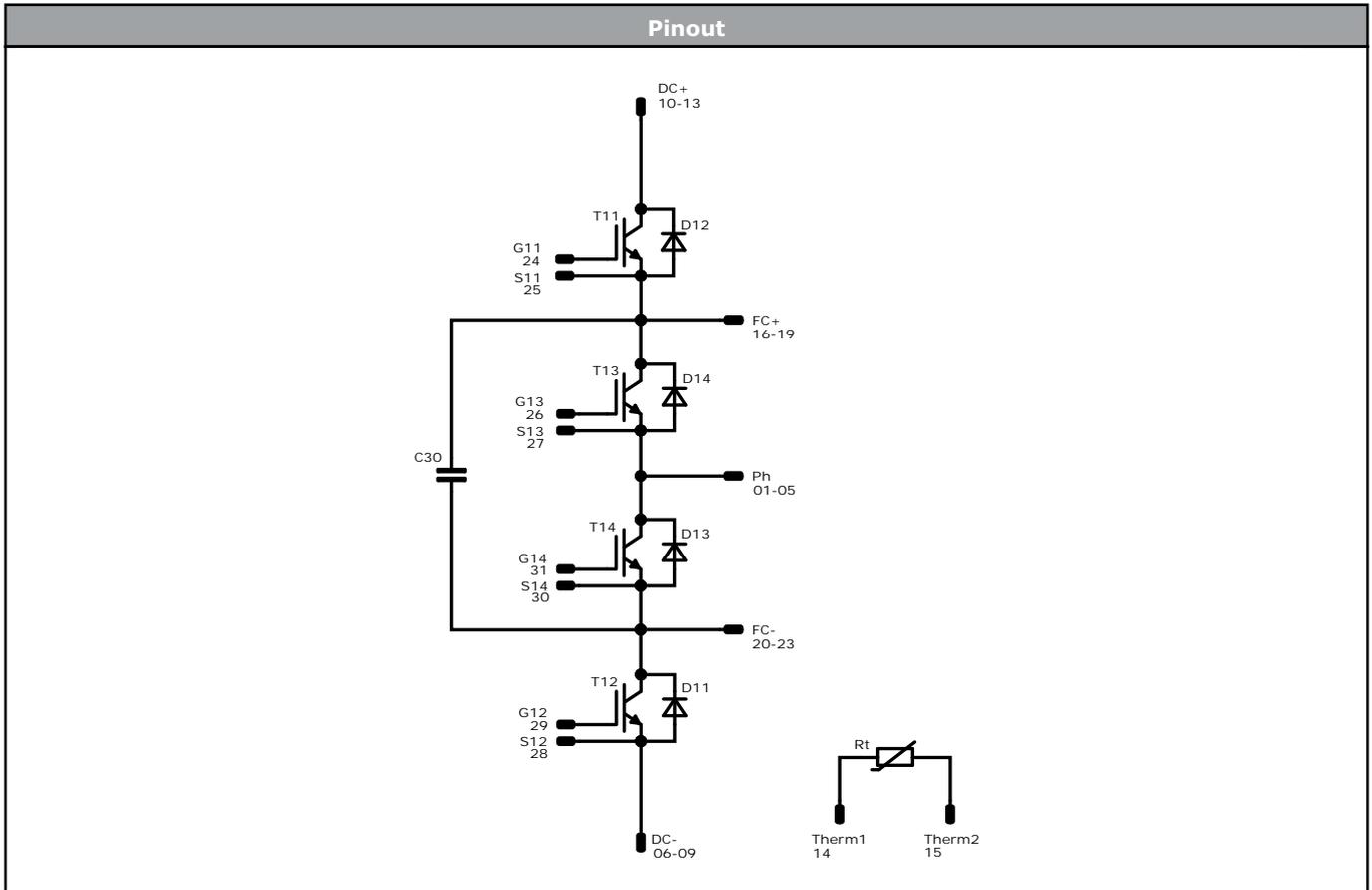
Marking						
	Text	Name NN-NNNNNNNNNNNNNN- TTTTTV WWYY UL VIN LLLLL SSSS	Date code WWYY	UL & VIN UL VIN	Lot LLLLL	Serial SSSS
	Datamatrix	Type&Ver TTTTTTTV	Lot number LLLLL	Serial SSSS	Date code WWYY	

Outline				
Pin table [mm]				
Pin	X	Y	Function	
1	14,35	0	Ph	
2	7,25	2,6	Ph	
3	7,25	0	Ph	
4	0	2,6	Ph	
5	0	0	Ph	
6	3,7	28,5	DC-	
7	6,3	28,5	DC-	
8	8,9	28,5	DC-	
9	11,5	28,5	DC-	
10	21,7	28,5	DC+	
11	24,3	28,5	DC+	
12	26,9	28,5	DC+	
13	29,5	28,5	DC+	
14	40,15	28,5	Therm1	
15	42,6	24,55	Therm2	
16	19,55	24,2	FC+	
17	18,55	8,8	FC+	
18	18,55	6,2	FC+	
19	18,55	3,6	FC+	
20	13,65	24,2	FC-	
21	13,95	17,2	FC-	
22	12,5	14,5	FC-	
23	13,45	11,8	FC-	
24	31,8	18	G11	
25	31,8	15	S11	
26	31,9	4,45	G13	
27	31,9	1,45	S13	
28	0,7	25,3	S12	
29	0,7	22,3	G12	
30	0,7	11,55	S14	
31	0,7	8,55	G14	

Tolerance of preparation: ±0.05mm at the end of pins
Dimension of coordinate axis is only other without tolerance



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Identification					
ID	Component	Voltage	Current	Function	Comment
T12	IGBT	650 V	200 A	AC 1 Switch L	
D11	FWD	650 V	200 A	AC 1 Diode L	
T11	IGBT	650 V	200 A	AC 1 Switch H	
D12	FWD	650 V	200 A	AC 1 Diode H	
T14	IGBT	650 V	200 A	AC 2 Switch L	
D13	FWD	650 V	200 A	AC 2 Diode L	
T13	IGBT	650 V	200 A	AC 2 Switch H	
D14	FWD	650 V	200 A	AC 2 Diode H	
C30	Capacitor	630 V		Flying Capacitor	
Rt	Thermistor			Thermistor	



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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-FY07FCA200RG-LQ45L60-D1-14	9 Jun. 2020		

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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.