B0-SP12PMA100M7-LQ99A78T
datasheet

***flow*PIM S3** — **1200 V / 100 A**

Features

- IGBT M7 with low VCEsat and improved EMC behavior
- New low inductive package
- Enhanced thermal performance

Target applications

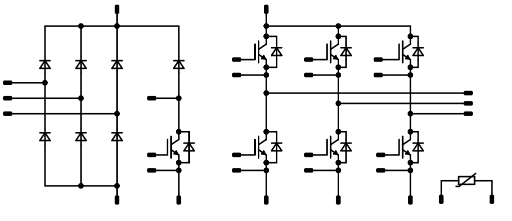
- Embedded Drives
- Industrial Drives

Types

- B0-SP12PMA100M7-LQ99A78T

flow S3 12 mm housing

Schematic



Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Inverter Switch					
Collector-emitter voltage	V_{CES}			1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	109	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	205	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V, V_{CC} = 800 V	T_j = 150 °C	9,5	µs
Maximum junction temperature	T_{jmax}			175	°C
Inverter Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	77	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	139	W
Maximum junction temperature	T_{jmax}			175	°C
Brake Switch					
Collector-emitter voltage	V_{CES}			1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	90	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	176	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	Conditions		Value	Unit
Brake Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	32	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		50	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	60	W
Maximum junction temperature	T_{jmax}			175	°C
Brake Sw. Protection Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	13	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		10	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	32	W
Maximum junction temperature	T_{jmax}			175	°C
Rectifier Diode					
Peak repetitive reverse voltage	V_{RRM}			1600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	110	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	890	A
Surge current capability	I^2t			3960	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	125	W
Maximum junction temperature	T_{jmax}			150	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		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
Isolation voltage	V_{isol}	AC Voltage	t_p = 1 min	2500	V
Creepage distance				>12,7	mm
Clearance				7,88	mm
Comparative Tracking Index	CTI			≥ 600	

*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
Inverter Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$			10	0,01	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		100	25 125 150		1,53 1,71 1,75	1,85[1]	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			100	µA
Gate-emitter leakage current	I_{GES}		20	0		25			0,5	µA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}		0	10		25		21000		pF
Output capacitance	C_{oes}		0	10		25		700		pF
Reverse transfer capacitance	C_{res}		0	10		25		280		pF
Gate charge	Q_g	V_{CC} = 600 V	15		100	25		700		nC
Thermal										
Thermal resistance junction to sink [2]	$R_{th(j-s)}$	λ_{paste} = 4,4 W/mK (PTM)						0,46		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	±15	600	100	25 125 150		177,92 176,32 176		ns
Rise time	t_r	R_{gon} = 4 Ω R_{goff} = 4 Ω	±15	600	100	25 125 150		27,52 31,36 32,64		ns
Turn-off delay time	$t_{d(off)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	±15	600	100	25 125 150		188,8 216,96 223,36		ns
Fall time	t_f	R_{gon} = 4 Ω R_{goff} = 4 Ω	±15	600	100	25 125 150		75,98 102,53 107,42		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=10,29 µC Q_{rFWD}=15,31 µC Q_{rFWD}=17,47 µC	±15	600	100	25 125 150		5,03 6,96 7,58		mWs
Turn-off energy (per pulse)	E_{off}		±15	600	100	25 125 150		7,05 9,74 10,56		mWs

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	
Inverter Diode										
Static										
Forward voltage	V_F				100	25 125 150		1,82 1,96 1,97	2,1(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25			40	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 4,4 W/mK (PTM)						0,68		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt=4096 A/µs di/dt=3530 A/µs di/dt=3376 A/µs	±15	600	100	25 125 150		135,5 136,84 137,89		A
Reverse recovery time	t_{rr}					25 125 150		220,6 355,08 403,89		ns
Recovered charge	Q_r					25 125 150		10,29 15,31 17,47		µC
Reverse recovered energy	E_{rec}					25 125 150		4,4 6,57 7,55		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		3148 2497 2218		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
Brake Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$			10	0,0075	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		75	25 125 150		1,55 1,7 1,75	1,9[1]	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			100	µA
Gate-emitter leakage current	I_{GES}		20	0		25			500	nA
Internal gate resistance	r_g							4		Ω
Input capacitance	C_{ies}		0	10		25		16000		pF
Output capacitance	C_{oes}		0	10		25		480		pF
Reverse transfer capacitance	C_{res}		0	10		25		190		pF
Gate charge	Q_g	V_{CC} = 600 V	15		75	25		570		nC
Thermal										
Thermal resistance junction to sink [2]	$R_{th(j-s)}$	λ_{paste} = 4,4 W/mK (PTM)						0,54		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	0/15	700	55	25 125 150		111,68 108,8 107,84		ns
Rise time	t_r	R_{gon} = 4 Ω R_{goff} = 4 Ω	0/15	700	55	25 125 150		38,72 45,44 47,36		ns
Turn-off delay time	$t_{d(off)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	0/15	700	55	25 125 150		442,56 515,84 535,68		ns
Fall time	t_f	R_{gon} = 4 Ω R_{goff} = 4 Ω	0/15	700	55	25 125 150		95,69 135,6 143,58		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=3,6 µC Q_{rFWD}=5,52 µC Q_{rFWD}=6,16 µC	0/15	700	55	25 125 150		4,26 5,31 5,56		mWs
Turn-off energy (per pulse)	E_{off}		0/15	700	55	25 125 150		5,37 7,79 8,19		mWs

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
Brake Diode										
Static										
Forward voltage	V_F				25	25 125 150		1,63 1,7 1,69	2,1(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25			35	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 4,4 W/mK (PTM)						1,58		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt=1318 A/µs di/dt=1118 A/µs di/dt=1105 A/µs	0/15	700	55	25 125 150		32,72 34,34 35,03		A
Reverse recovery time	t_{rr}					25 125 150		256,31 380,02 423,75		ns
Recovered charge	Q_r					25 125 150		3,6 5,52 6,16		µC
Reverse recovered energy	E_{rec}					25 125 150		1,56 2,59 2,94		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		206,58 227,2 225,17		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	
Brake Sw. Protection Diode										
Static										
Forward voltage	V_F				5	25 125 150		1,57 1,66 1,65	2,1(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25			20	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 4,4 W/mK (PTM)						2,92		K/W
Rectifier Diode										
Static										
Forward voltage	V_F				60	25 125 150		1,04 0,973 0,956	1,5(1)	V
Reverse leakage current	I_R	V_r = 1600 V				25 150			100 2	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 4,4 W/mK (PTM)						0,56		K/W

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

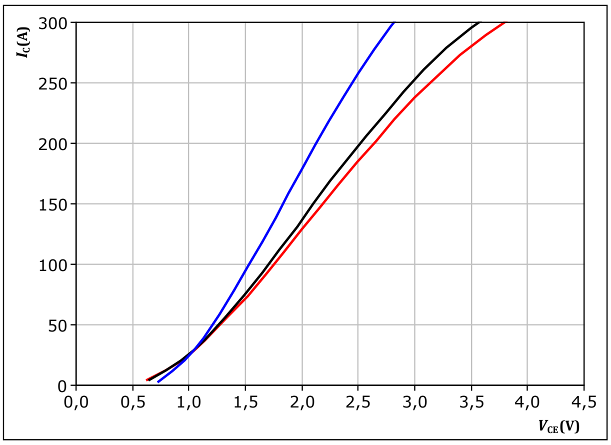
(1) Value at chip level
(2) Only valid with pre-applied Vincotech thermal interface material.

Inverter Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

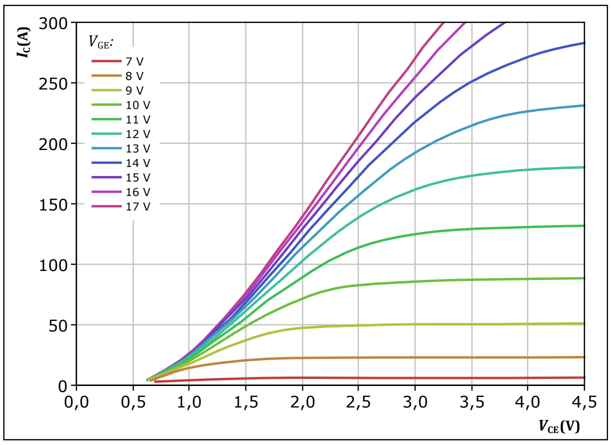


t_p =	250	μs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 2. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



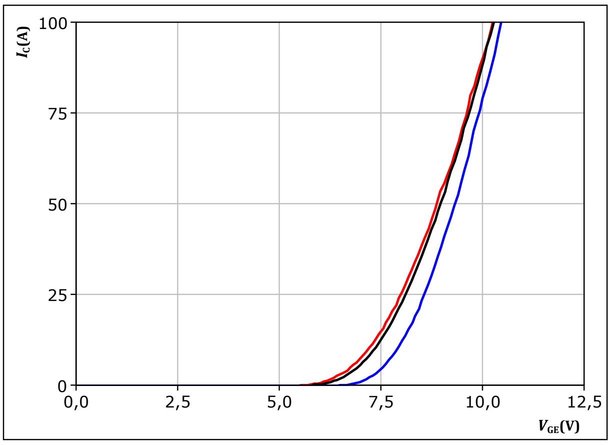
t_p =	250	μs
T_j =	150	°C

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

figure 3. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})

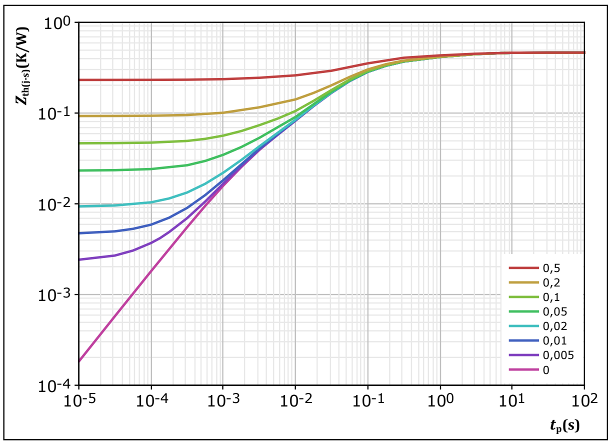


t_p =	250	μs		25 °C
V_{CE} =	10	V	T_j:	125 °C
				150 °C

figure 4. **IGBT**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,464	K/W

IGBT thermal model values

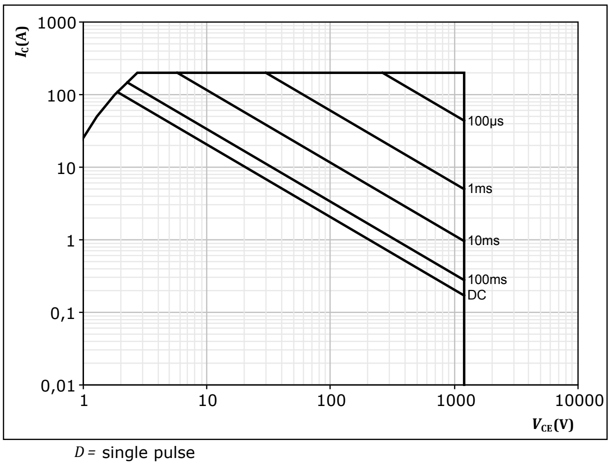
R (K/W)	τ (s)
5,07E-02	2,79E+00
7,33E-02	5,73E-01
1,97E-01	9,12E-02
1,18E-01	2,74E-02
2,48E-02	2,11E-03

Inverter Switch Characteristics

figure 5. **IGBT**

Safe operating area

I_C = f(V_{CE})

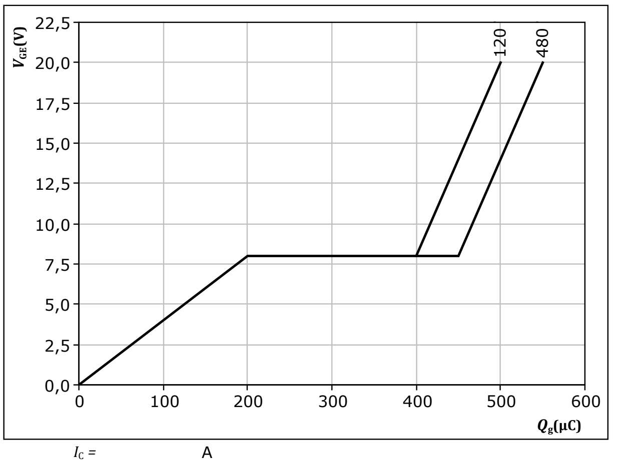


D = single pulse
T_s = 80 °C
V_{GE} = 15 V
T_j = T_{jmax}

figure 6. **IGBT**

Gate voltage vs gate charge

V_{GE} = f(Q_g)



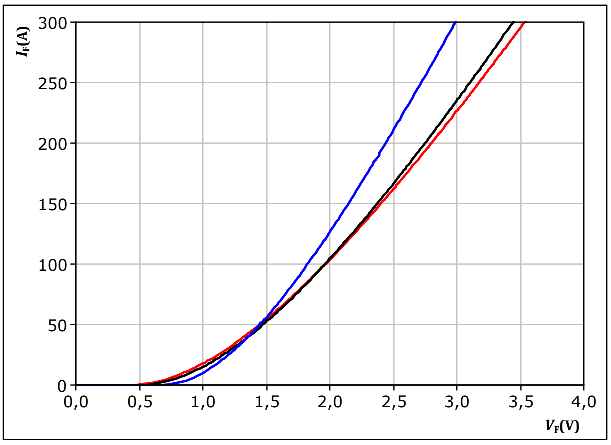
I_C = A
T_j = 25 °C

Inverter Diode Characteristics

figure 7. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



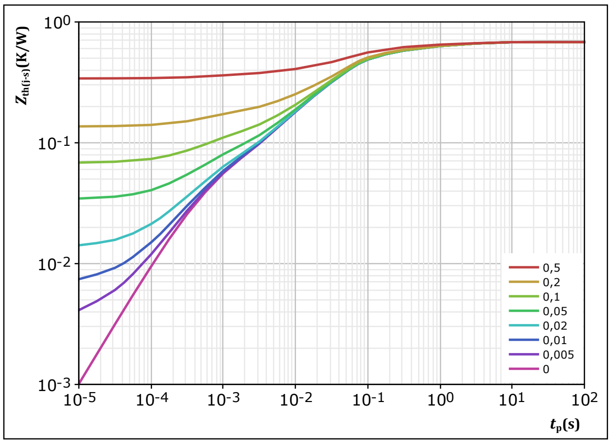
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 8. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,681 K/W

FWD thermal model values

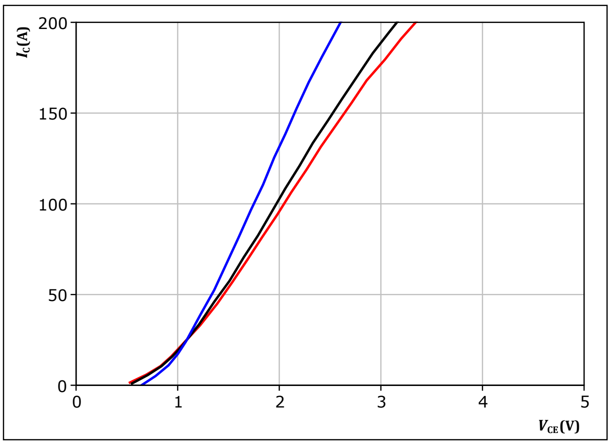
R (K/W)	τ (s)
6,44E-02	2,44E+00
1,07E-01	3,59E-01
3,84E-01	4,92E-02
8,35E-02	7,03E-03
4,34E-02	5,30E-04

Brake Switch Characteristics

figure 9.	**IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

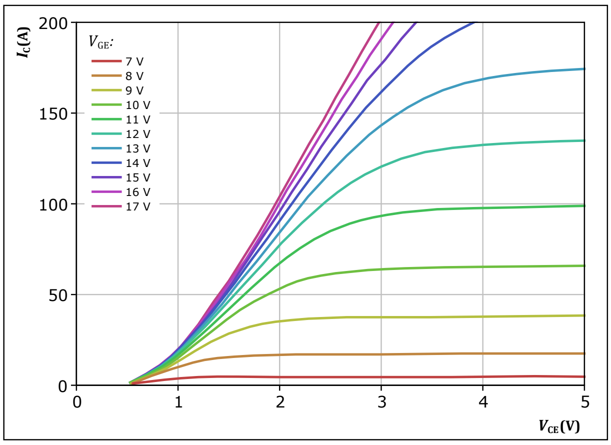


t_p =	250	µs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 10.	**IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



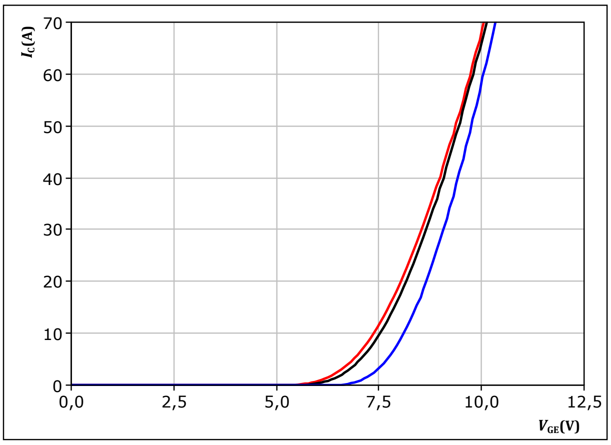
t_p =	250	µs
T_j =	150	°C

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

figure 11.	**IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

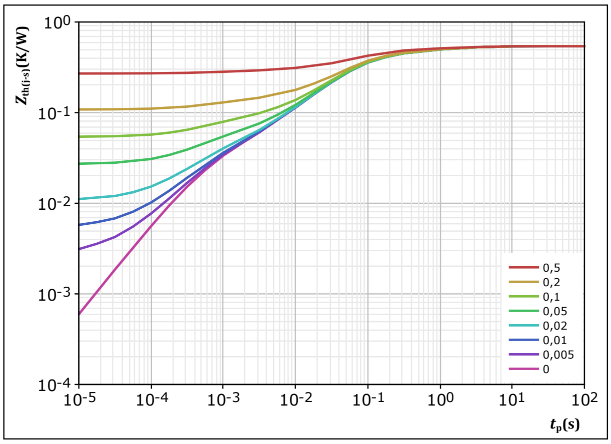


t_p =	250	µs		25 °C
V_{CE} =	10	V	T_j:	125 °C
				150 °C

figure 12.	**IGBT**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,54	K/W

IGBT thermal model values

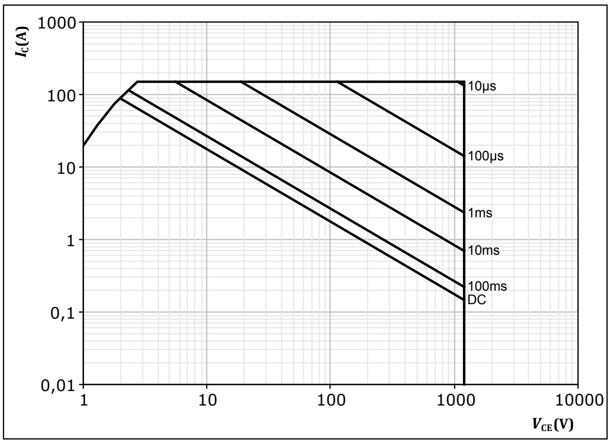
R (K/W)	τ (s)
5,00E-02	2,48E+00
7,47E-02	4,69E-01
2,01E-01	9,12E-02
1,65E-01	3,27E-02
2,53E-02	4,04E-03
2,43E-02	5,25E-04

Brake Switch Characteristics

figure 13.	IGBT

Safe operating area

I_C = f(V_{CE})



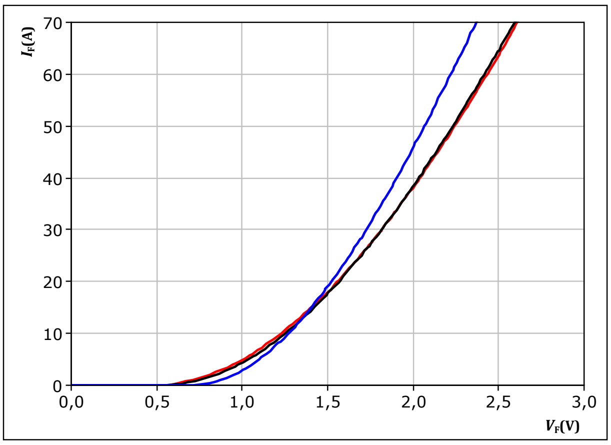
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

Brake Diode Characteristics

figure 14. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



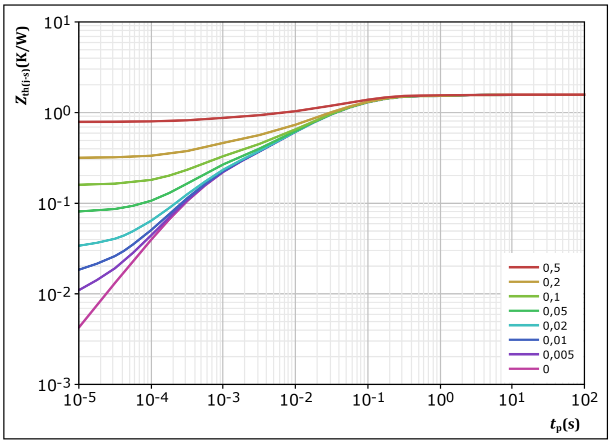
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 15. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 1,578 K/W

FWD thermal model values

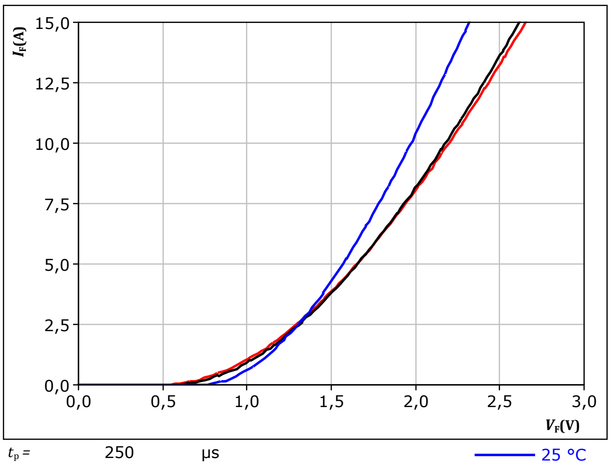
R (K/W)	τ (s)
6,04E-02	2,69E+00
5,84E-01	9,86E-02
5,77E-01	2,18E-02
1,94E-01	3,61E-03
1,63E-01	4,75E-04

Brake Sw. Protection Diode Characteristics

figure 16. FWD

Typical forward characteristics

$I_F = f(V_F)$



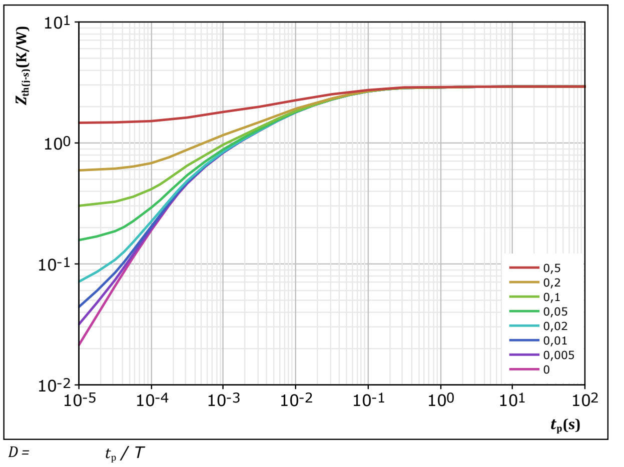
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 17. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 2,925 K/W

FWD thermal model values

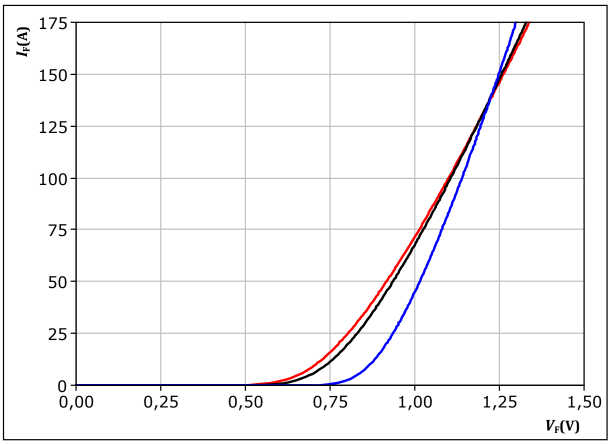
R (K/W)	τ (s)
8,72E-02	1,61E+00
8,63E-01	6,27E-02
8,63E-01	9,50E-03
5,66E-01	2,17E-03
5,45E-01	3,02E-04

Rectifier Diode Characteristics

figure 18. **Rectifier**

Typical forward characteristics

I_F = f(V_F)

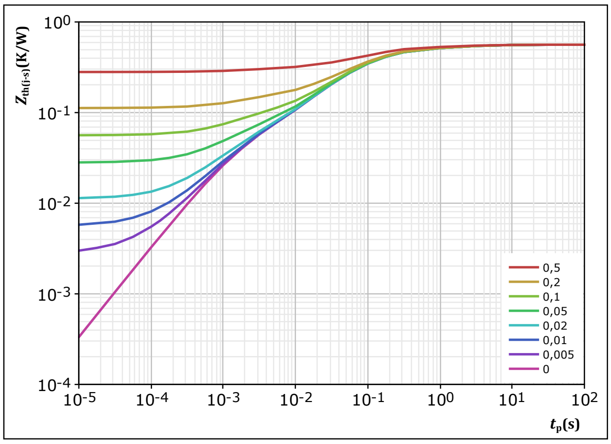


t_p =	250	µs	25 °C
		T_j:	125 °C
			150 °C

figure 19. **Rectifier**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,561	K/W

Rectifier thermal model values

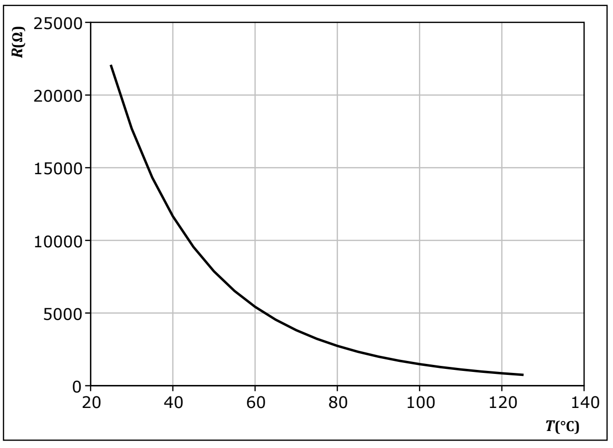
R (K/W)	τ (s)
3,37E-02	4,48E+00
8,84E-02	6,54E-01
3,02E-01	9,39E-02
1,00E-01	2,07E-02
3,73E-02	1,48E-03

Thermistor Characteristics

figure 20.	Thermistor

Typical NTC characteristic as function of temperature

R_T = f(T)

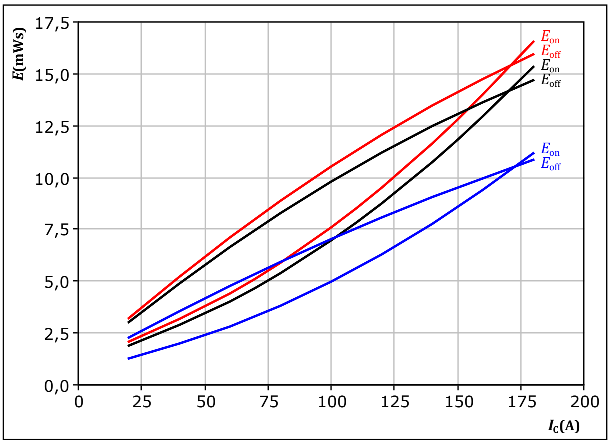


Inverter Switching Characteristics

figure 21. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



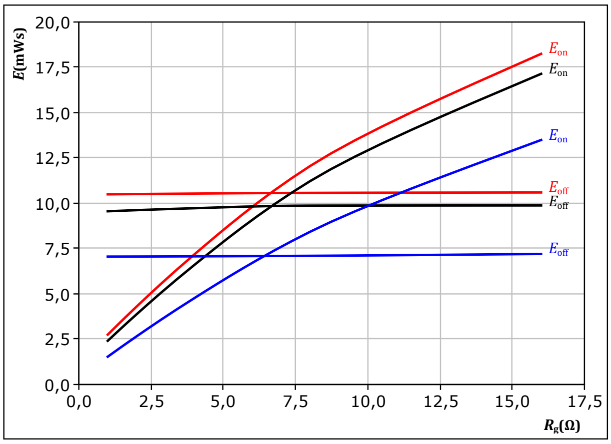
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	4	Ω		150 °C
R_{goff} =	4	Ω		

figure 22. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



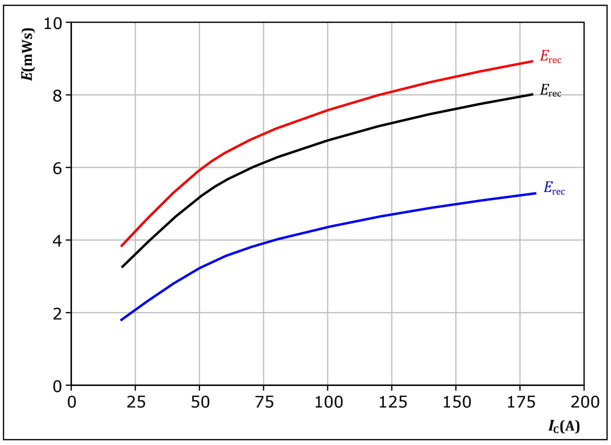
With an inductive load at

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

figure 23. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



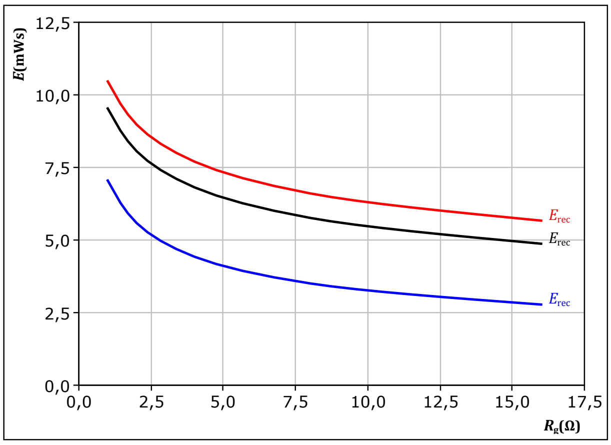
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	4	Ω		150 °C

figure 24. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

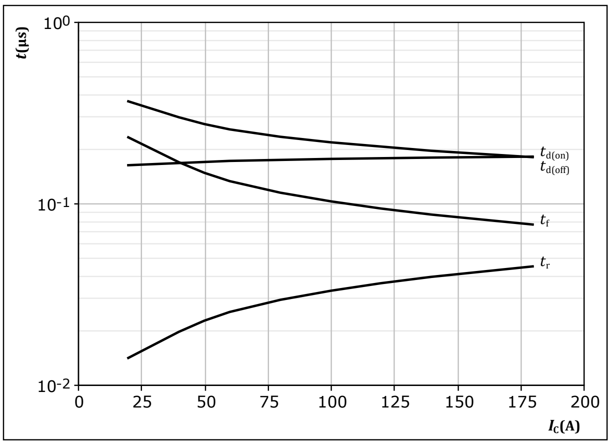
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	100	A		150 °C

Inverter Switching Characteristics

figure 25. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



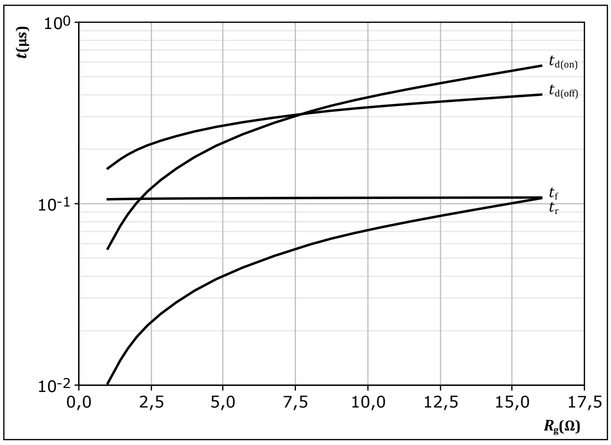
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 26. **IGBT**

Typical switching times as a function of gate resistor

t = f(R_g)



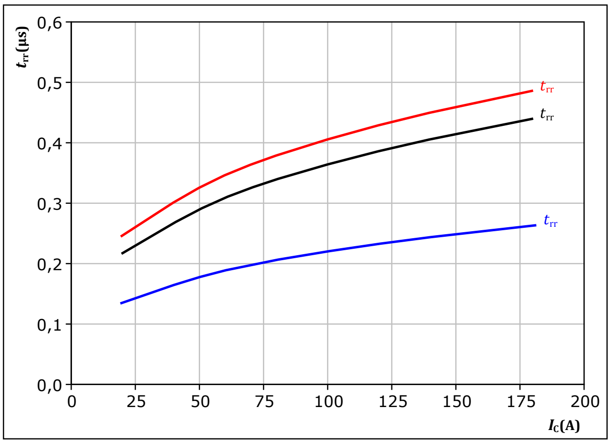
With an inductive load at

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

figure 27. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

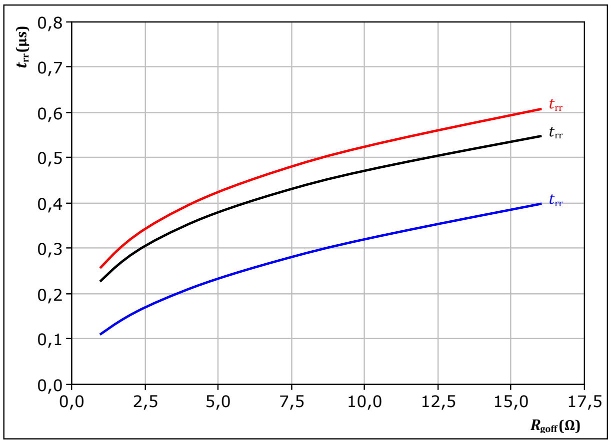
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	4	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 28. **FWD**

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

t_{rr} = f(R_{goff})



With an inductive load at

V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	100	A

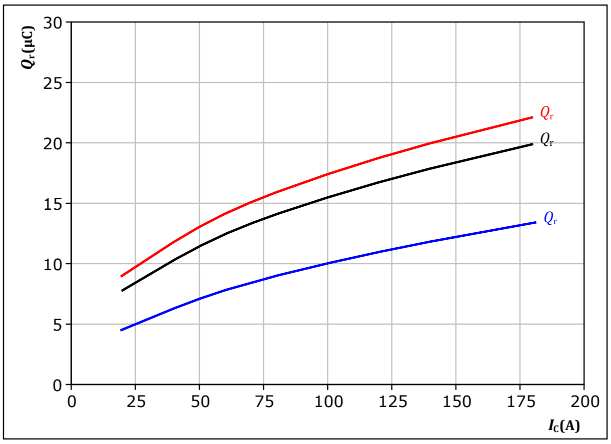
T_j: 25 °C, 125 °C, 150 °C

Inverter Switching Characteristics

figure 29. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



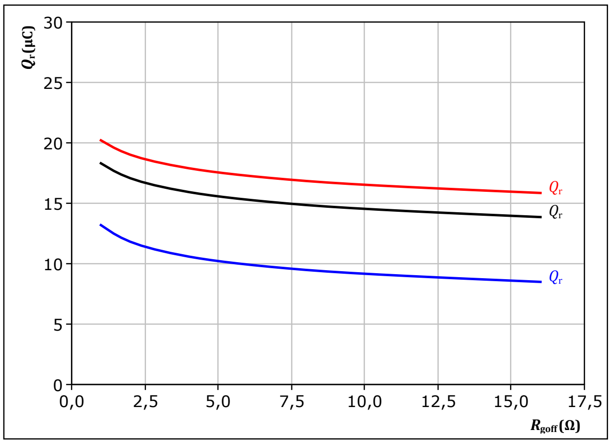
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	4	Ω		150 °C

figure 30. **FWD**

Typical recovered charge as a function of turn off gate resistor

$Q_r = f(R_{goff})$



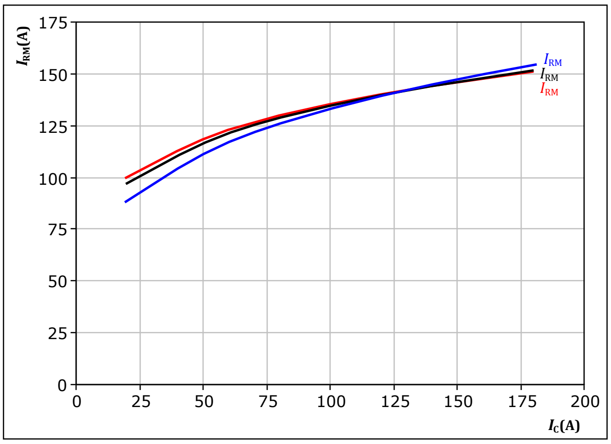
With an inductive load at

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

figure 31. **FWD**

Typical peak reverse recovery current as a function of collector current

$I_{RM} = f(I_C)$



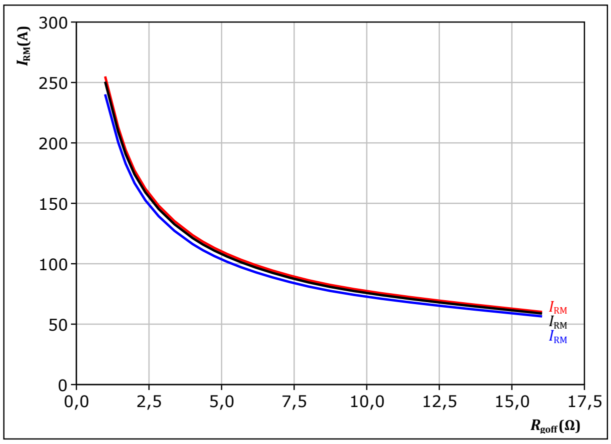
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	4	Ω		150 °C

figure 32. **FWD**

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

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



With an inductive load at

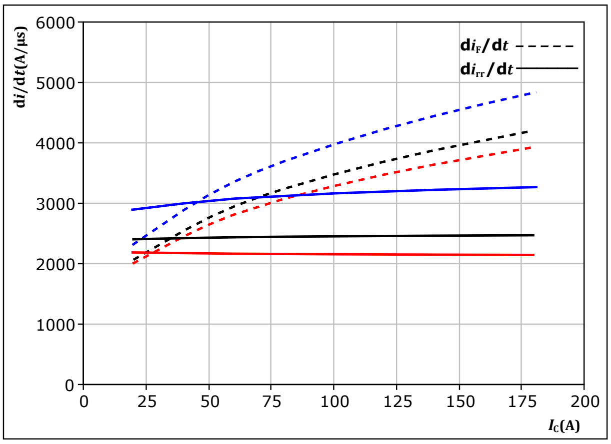
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	100	A		150 °C

Inverter Switching Characteristics

figure 33. **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)



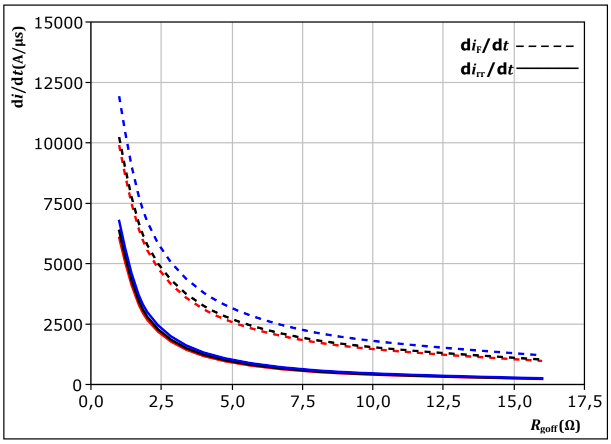
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	4	Ω		150 °C

figure 34. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of turn off gate resistor

di_F/dt, di_{rr}/dt = f(R_{goff})



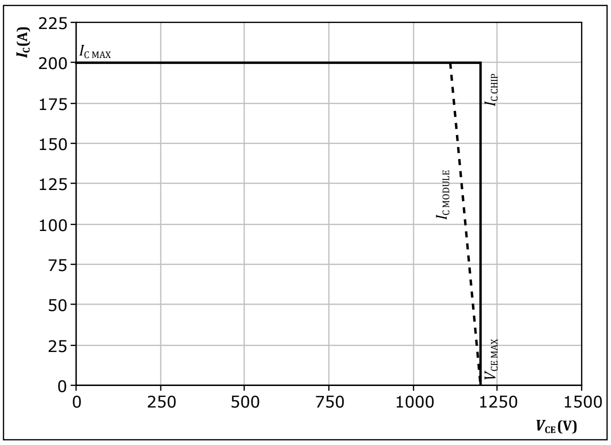
With an inductive load at

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

figure 35. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



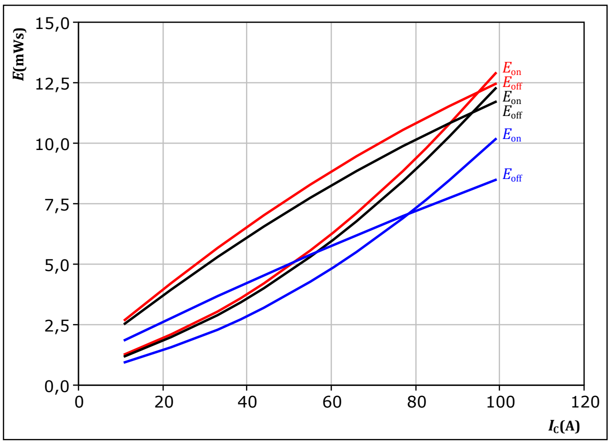
At	T_j =	150	°C
	R_{gon} =	4	Ω
	R_{goff} =	4	Ω

Brake Switching Characteristics

figure 36. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



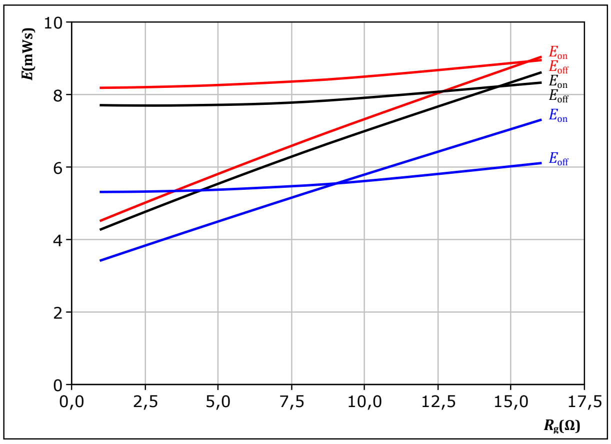
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	0/15	V		125 °C
R_{gon} =	4	Ω		150 °C
R_{goff} =	4	Ω		

figure 37. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



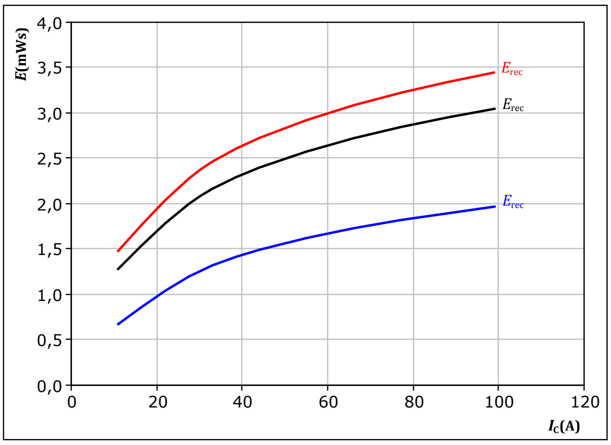
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	0/15	V		125 °C
I_C =	55	A		150 °C

figure 38. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



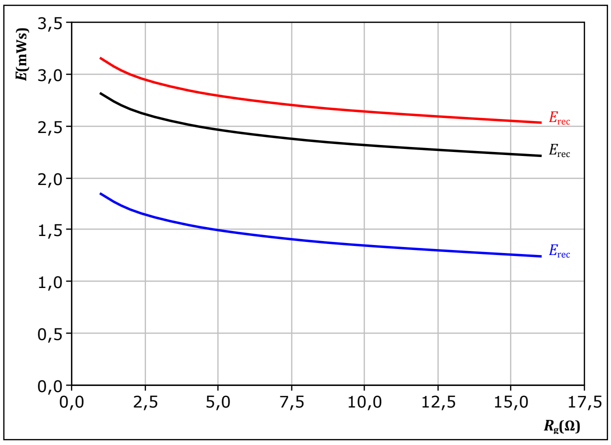
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	0/15	V		125 °C
R_{gon} =	4	Ω		150 °C

figure 39. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

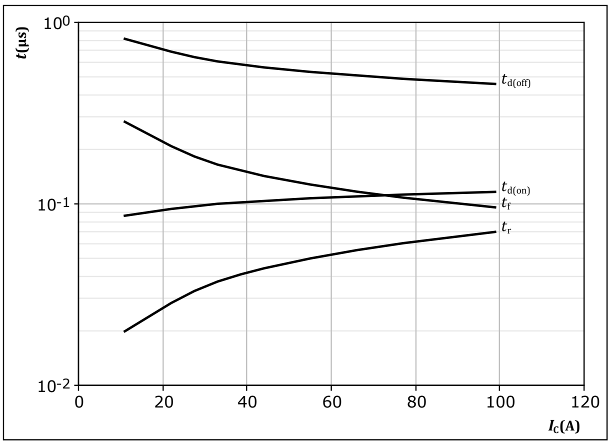
V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	0/15	V		125 °C
I_C =	55	A		150 °C

Brake Switching Characteristics

figure 40. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



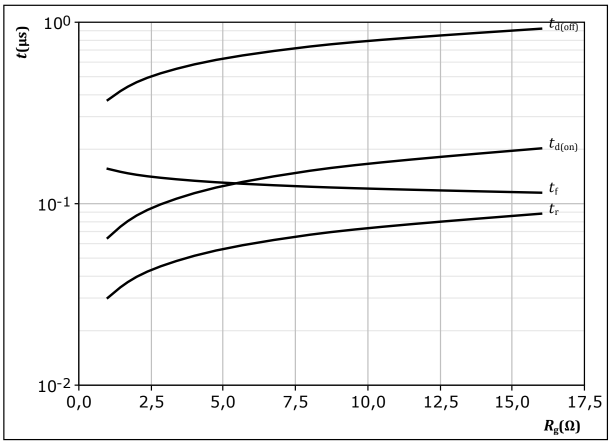
With an inductive load at

T_j =	150	°C
V_{CE} =	700	V
V_{GE} =	0/15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 41. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



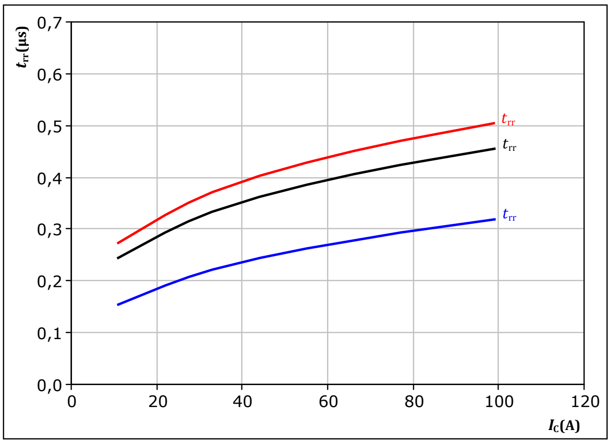
With an inductive load at

T_j =	150	°C
V_{CE} =	700	V
V_{GE} =	0/15	V
I_C =	55	A

figure 42. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



With an inductive load at

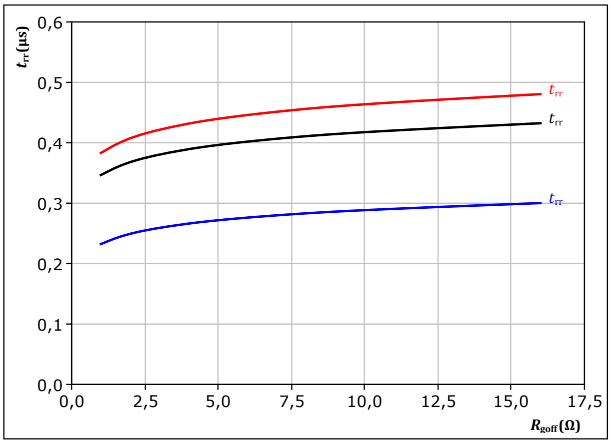
V_{CE} =	700	V
V_{GE} =	0/15	V
R_{gon} =	4	Ω

T_j: 25 °C / 125 °C / 150 °C

figure 43. **FWD**

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

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



With an inductive load at

V_{CE} =	700	V
V_{GE} =	0/15	V
I_C =	55	A

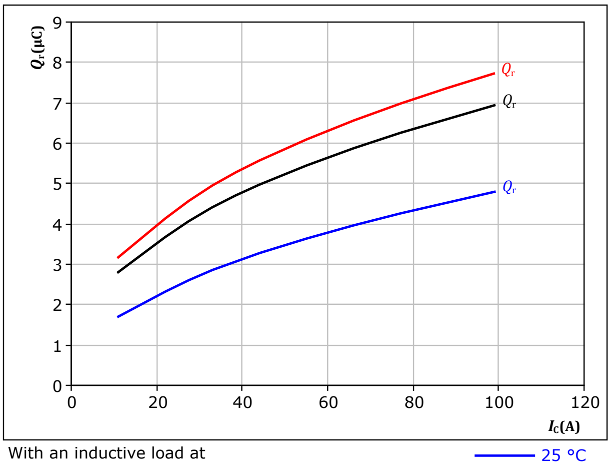
T_j: 25 °C / 125 °C / 150 °C

Brake Switching Characteristics

figure 44. FWD

Typical recovered charge as a function of collector current

Q_r = f(I_C)



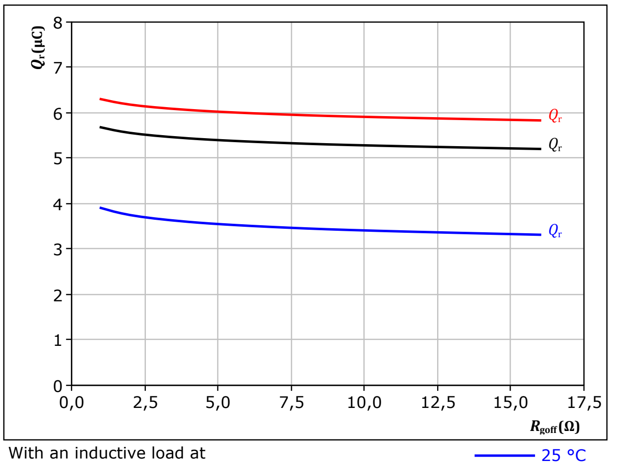
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C / 125 °C / 150 °C
V_{GE} =	0/15	V		
R_{gon} =	4	Ω		

figure 45. FWD

Typical recovered charge as a function of turn off gate resistor

Q_r = f(R_{goff})



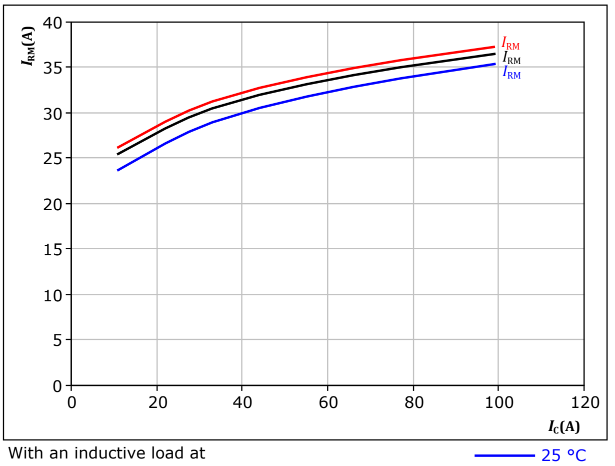
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C / 125 °C / 150 °C
V_{GE} =	0/15	V		
I_C =	55	A		

figure 46. FWD

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



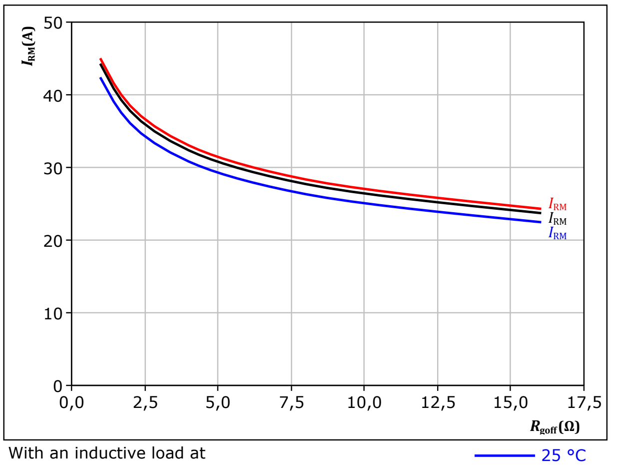
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C / 125 °C / 150 °C
V_{GE} =	0/15	V		
R_{gon} =	4	Ω		

figure 47. FWD

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

I_{RM} = f(R_{goff})



With an inductive load at

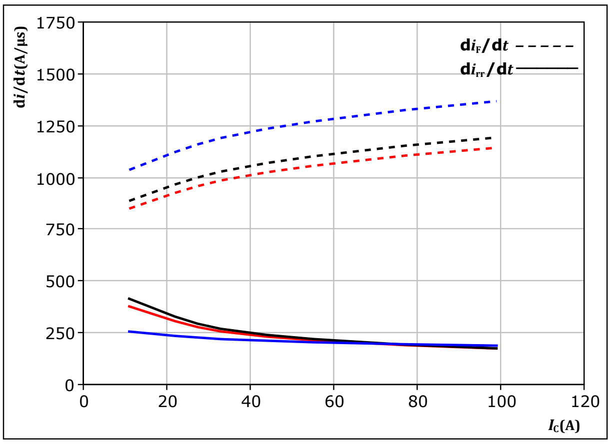
V_{CE} =	700	V	T_j:	25 °C / 125 °C / 150 °C
V_{GE} =	0/15	V		
I_C =	55	A		

Brake Switching Characteristics

figure 48. **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)



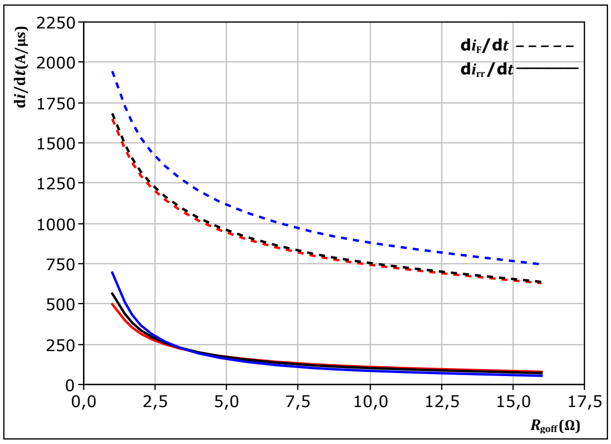
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	0/15	V		125 °C
R_{gon} =	4	Ω		150 °C

figure 49. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of turn off gate resistor

di_F/dt, di_{rr}/dt = f(R_{goff})



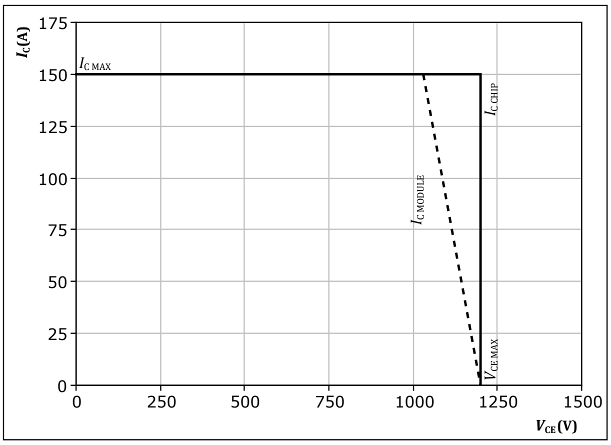
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	0/15	V		125 °C
I_C =	55	A		150 °C

figure 50. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At	T_j =	150	°C
	R_{gon} =	4	Ω
	R_{goff} =	4	Ω

Switching Definitions

figure 51. IGBT

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

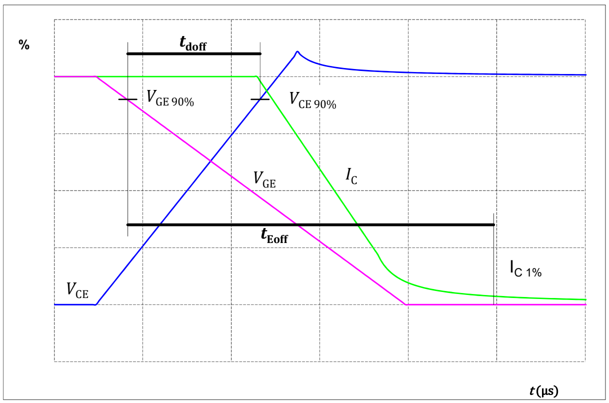


figure 52. IGBT

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

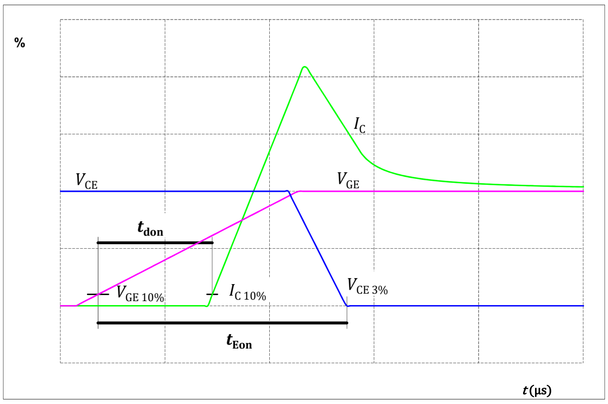


figure 53. IGBT

Turn-off Switching Waveforms & definition of t_f

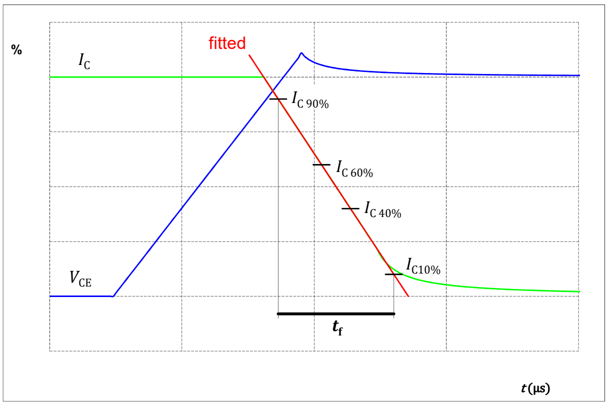
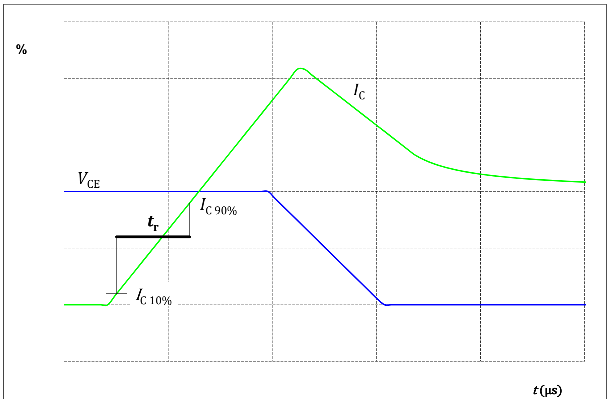


figure 54. IGBT

Turn-on Switching Waveforms & definition of t_r



Switching Definitions

figure 55. **FWD**

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

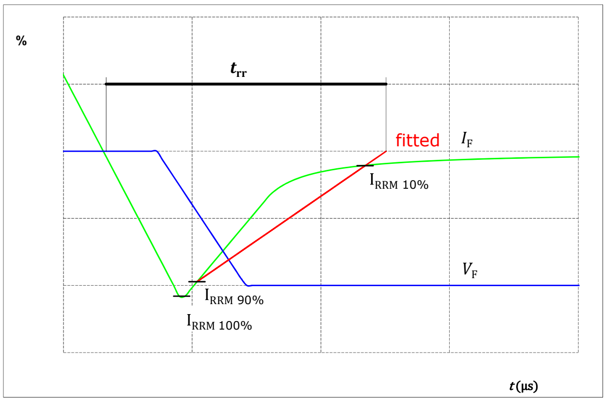
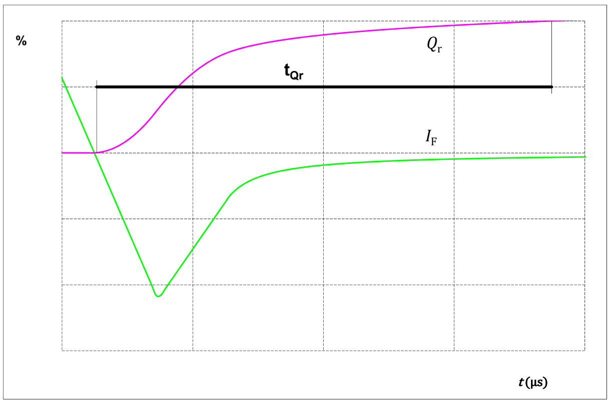


figure 56. **FWD**

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



Ordering Code	
Version	**Ordering Code**
With thermal paste (4,4 W/mK, PTM6000)	B0-SP12PMA100M7-LQ99A78T-/7/

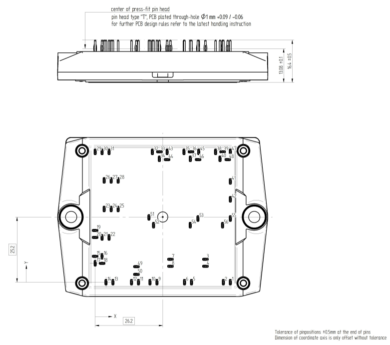
Marking

	**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		

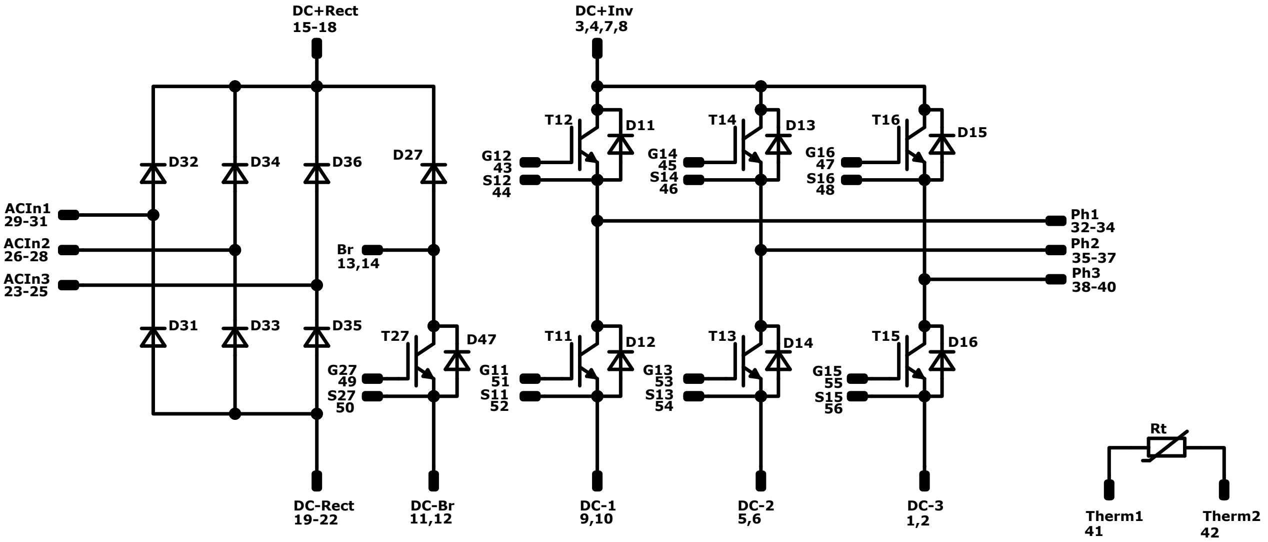
Outline

Pin table [mm]

Pin	X	Y	Function	29	0	50,4	AcIn1
1	52,4	0	DC-3	30	2,7	50,4	AcIn1
2	49,7	0	DC-3	31	5,4	50,4	AcIn1
3	42,75	8,85	DC+Inv	32	22,2	50,4	Ph1
4	42,75	6,15	DC+Inv	33	24,9	50,4	Ph1
5	37,35	0	DC-2	34	24,9	47,7	Ph1
6	34,65	0	DC-2	35	34,45	50,4	Ph2
7	29,2	8,85	DC+Inv	36	37,15	50,4	Ph2
8	29,2	6,15	DC+Inv	37	36,9	47,7	Ph2
9	23,95	0	DC-1	38	46,7	50,4	Ph3
10	21,25	0	DC-1	39	49,4	50,4	Ph3
11	16,8	0	DC-Br	40	48,4	47,7	Ph3
12	14,1	0	DC-Br	41	52,4	38,95	Therm1
13	6,9	0	Br	42	52,4	32,05	Therm2
14	4,2	0	Br	43	27,9	50,4	G12
15	0	10	DC+Rect	44	27,9	47,4	S12
16	2,7	10	DC+Rect	45	40,15	50,4	G14
17	0	7,3	DC+Rect	46	39,9	47,4	S14
18	2,7	7,3	DC+Rect	47	52,4	50,4	G16
19	0	20	DC-Rect	48	51,4	47,4	S16
20	0	17,3	DC-Rect	49	16	6	G27
21	2,7	17,3	DC-Rect	50	16	3	S27
22	5,4	17,3	DC-Rect	51	20,85	25,05	G11
23	3,5	28,3	AcIn3	52	22,65	22,05	S11
24	6,2	28,3	AcIn3	53	39,85	24,6	G13
25	8,9	28,3	AcIn3	54	36,85	22,05	S13
26	3,5	39,35	AcIn2	55	52,4	24,6	G15
27	6,2	39,35	AcIn2	56	49,4	22,05	S15
28	8,9	39,35	AcIn2				



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14, T15, T16	IGBT	1200 V	100 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	FWD	1200 V	100 A	Inverter Diode	
T27	IGBT	1200 V	75 A	Brake Switch	
D27	FWD	1200 V	25 A	Brake Diode	
D47	FWD	1200 V	5 A	Brake Sw. Protection Diode	
D31, D32, D33, D34, D35, D36	Rectifier	1600 V	60 A	Rectifier Diode	
Rt	Thermistor			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 45	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* S3 packages see vincotech.com website.

Package data
Package data for *flow* S3 packages see vincotech.com website.

Vincotech thermistor reference
See Vincotech thermistor reference table at 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
B0-SP12PMA100M7-LQ99A78T-D1-14	25 Jan. 2021		
B0-SP12PMA100M7-LQ99A78T-D2-14	4 Aug. 2021	Module marking is updated with UL logo, product is unchanged	