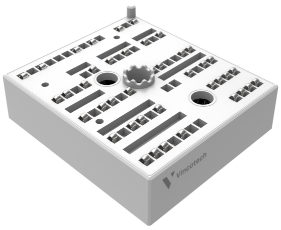
80-M212PMB015SC-K228A42
datasheet

MiniSKiiP® PIM 2 **1200 V / 15 A**

Features

- Trench Fieldstop IGBT4 technology
- Open emitter configuration
- Solder-free spring contact technology
- Built-in PTC

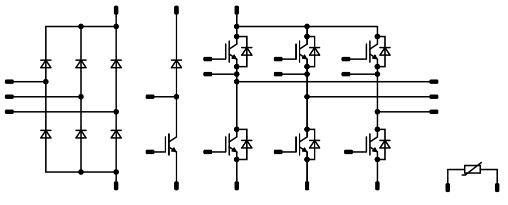
MiniSKiiP® 2 16 mm housing



Target applications

- Industrial Drives

Schematic



Types

- 80-M212PMB015SC-K228A42

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	26	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		45	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	88	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	10	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	21	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 25 °C	65	A
Surge current capability	I^2t			21	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	66	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	26	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		45	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	88	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	10	μs
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	21	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 25 °C	65	A
Surge current capability	I^2t			21	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	66	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	43	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	200	A
Surge current capability	I^2t			200	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	58	W
Maximum junction temperature	T_{jmax}			150	°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 s	5500	V
Isolation voltage	V_{isol}	AC Voltage	t_p = 1 min	2500	V
Creepage distance		With std lid For more informations see handling instructions		6,3	mm
Clearance		With std lid For more informations see handling instructions		6,3	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	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0005	25	5,3	5,8	6,3	V
Collector-emitter saturation voltage	V_{CEsat}		15		15	25 125 150	1,58	1,87 2,14 2,21	2,07(1)	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			2	µA
Gate-emitter leakage current	I_{GES}		20	0		25			120	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	25		25		890		pF
Reverse transfer capacitance	C_{res}	f = 1 Mhz	0	25		25		30		pF
Gate charge	Q_g		20		0	25		120		nC
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 2,5 W/mK (HPTP)						1,08		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 16 Ω R_{goff} = 16 Ω	±15	600	15	25 125 150		51,2 51,52 52,16		ns
Rise time	t_r	R_{gon} = 16 Ω R_{goff} = 16 Ω	±15	600	15	25 125 150		28,16 29,12 28,8		ns
Turn-off delay time	$t_{d(off)}$	R_{gon} = 16 Ω R_{goff} = 16 Ω	±15	600	15	25 125 150		173,12 235,52 251,52		ns
Fall time	t_f	R_{gon} = 16 Ω R_{goff} = 16 Ω	±15	600	15	25 125 150		121,98 181,31 203,13		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,674 µC Q_{rFWD}=1,66 µC Q_{rFWD}=2,07 µC	±15	600	15	25 125 150		0,582 0,884 1,01		mWs
Turn-off energy (per pulse)	E_{off}		±15	600	15	25 125 150		1,07 1,62 1,82		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				15	25 150		2,6 2,65	2,71(1) 2,77(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25 150		 900	60 1800	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 2,5 W/mK (HPTP)						1,44		K/W
Dynamic										
Peak recovery current	I_{RRM}	d*i*/d*t*=616 A/µs d*i*/d*t*=584 A/µs d*i*/d*t*=502 A/µs	±15	600	15	25 125 150		7,66 10,85 12,11		A
Reverse recovery time	t_{rr}					25 125 150		211,79 405 460,93		ns
Recovered charge	Q_r					25 125 150		0,674 1,66 2,07		µC
Reverse recovered energy	E_{rec}					25 125 150		0,287 0,744 0,928		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		102,1 80,86 85,09		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	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0005	25	5,3	5,8	6,3	V
Collector-emitter saturation voltage	V_{CEsat}		15		15	25 125 150	1,58	1,87 2,14 2,21	2,07(1)	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			2	µA
Gate-emitter leakage current	I_{GES}		20	0		25			120	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	25		25		890		pF
Reverse transfer capacitance	C_{res}	f = 1 Mhz	0	25		25		30		pF
Gate charge	Q_g		20		0	25		120		nC
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 2,5 W/mK (HPTP)						1,08		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 16 Ω R_{goff} = 16 Ω	0/15	700	15	25 125 150		23,36 23,04 22,72		ns
Rise time	t_r					25 125 150		33,28 33,6 34,24		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		223,04 292,8 309,76		ns
Fall time	t_f					25 125 150		107,35 168,96 197,48		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,701 µC Q_{rFWD}=1,66 µC Q_{rFWD}=2,09 µC				25 125 150		0,841 1,23 1,4		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		1,2 1,9 2,12		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]	Values Min	Typ	Max	Unit
Brake Diode										
Static										
Forward voltage	V_F				15	25 150		2,6 2,65	2,71(1) 2,77(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25 150		 900	60 1800	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 2,5 W/mK (HPTP)						1,44		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt=344 A/µs di/dt=401 A/µs di/dt=341 A/µs	0/15	700	15	25 125 150		7,19 10,15 11,12		A
Reverse recovery time	t_{rr}					25 125 150		224,11 387,2 452,5		ns
Recovered charge	Q_r					25 125 150		0,701 1,66 2,09		µC
Reverse recovered energy	E_{rec}					25 125 150		0,337 0,839 1,06		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		84,03 67,45 64,87		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	
Rectifier Diode										
Static										
Forward voltage	V_F				18	25 125 150		1,11 1,03 1,02	1,5(1)	V
Reverse leakage current	I_R	V_r = 1600 V				25 150			100 1000	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 2,5 W/mK (HPTP)						1,2		K/W
Thermistor										
Static										
Rated resistance	R					25		1		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1670 Ω				100	-2		2	%
Maximum Current	I_{max}							3		mA
Power dissipation constant	d					25		0,76		mW/K
A-value	A							$7{,}635 \times 10^{-3}$		1/K
B-value	B							$1{,}73 \times 10^{-5}$		$1/K^2$
Vincotech Thermistor Reference									E	

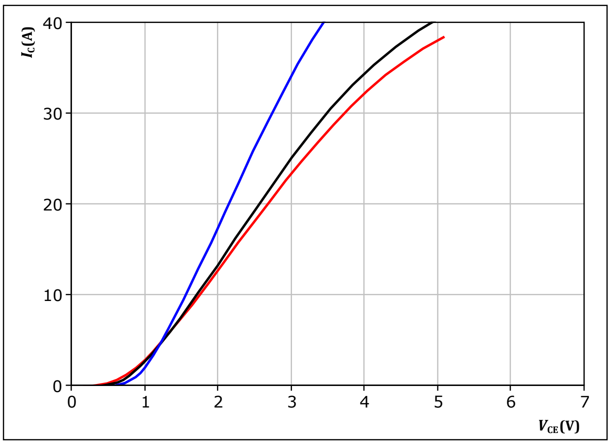
(1) Value at chip level
(2) Only valid with pre-applied Vincotech thermal interface material.

Inverter Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

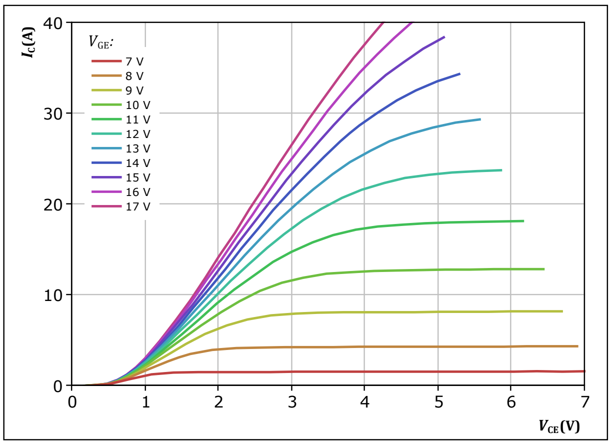


t_p =	250	µs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 2. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



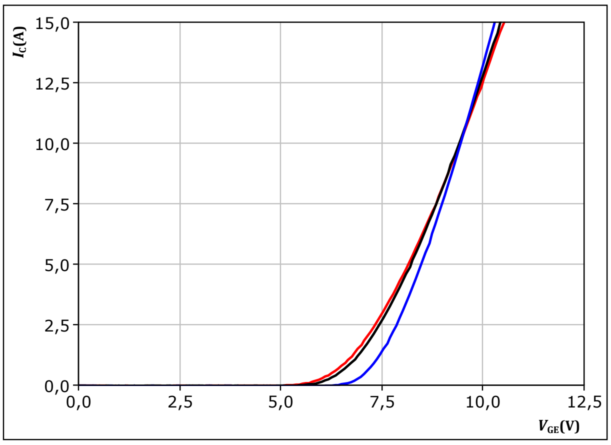
t_p =	250	µs
T_j =	150	°C

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

figure 3. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})

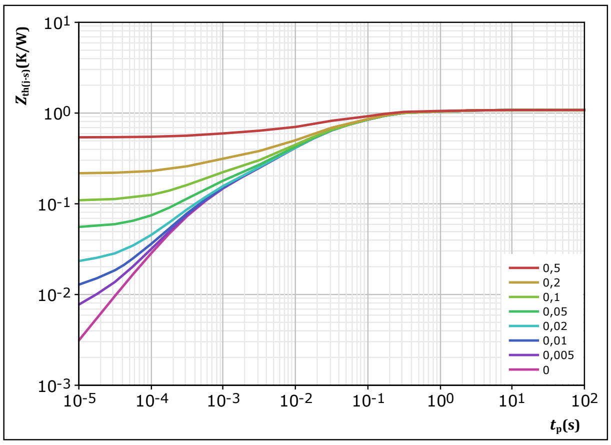


t_p =	250	µs		25 °C
V_{CE} =	10	V	T_j:	125 °C
				150 °C

figure 4. **IGBT**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	1,08	K/W

IGBT thermal model values

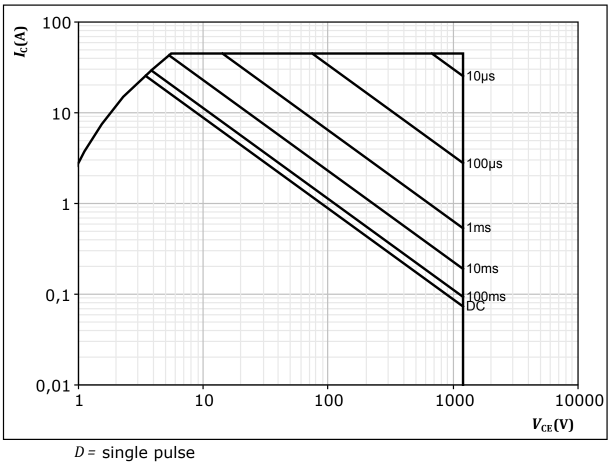
R (K/W)	τ (s)
7,13E-02	1,56E+00
4,66E-01	9,71E-02
3,95E-01	1,21E-02
8,84E-02	1,02E-03
5,92E-02	3,09E-04

Inverter Switch Characteristics

figure 5.	**IGBT**

Safe operating area

I_C = f(V_{CE})



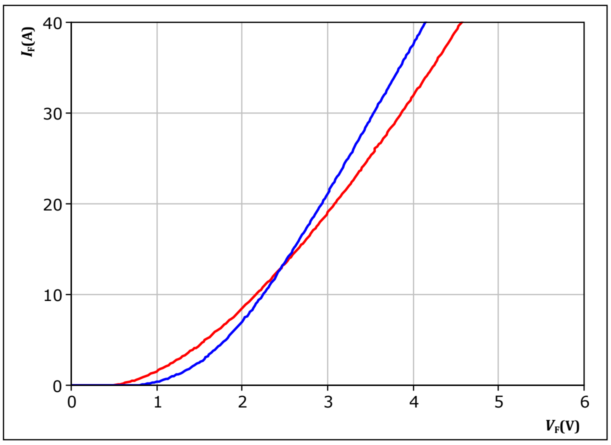
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

Inverter Diode Characteristics

figure 6. **FWD**

Typical forward characteristics

I_F = f(V_F)



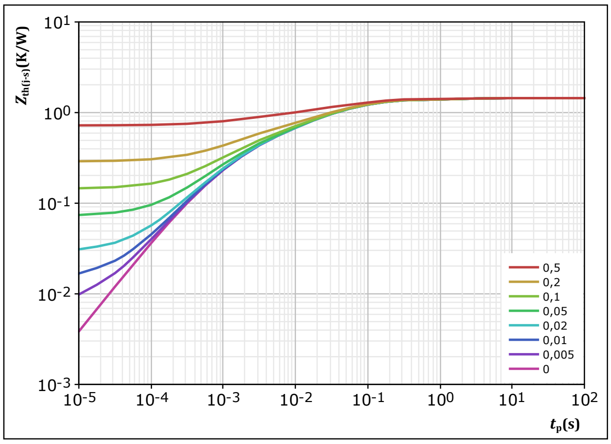
t_p = 250 µs

T_j: 25 °C, 150 °C

figure 7. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,445 K/W

FWD thermal model values

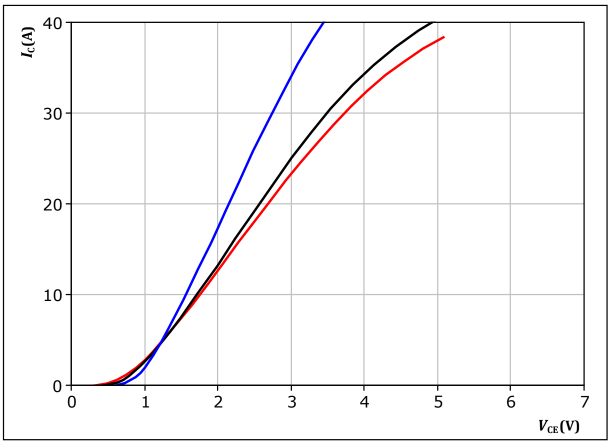
R (K/W)	τ (s)
8,37E-02	1,83E+00
5,67E-01	7,20E-02
4,45E-01	1,17E-02
2,82E-01	1,68E-03
6,71E-02	3,86E-04

Brake Switch Characteristics

figure 8. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

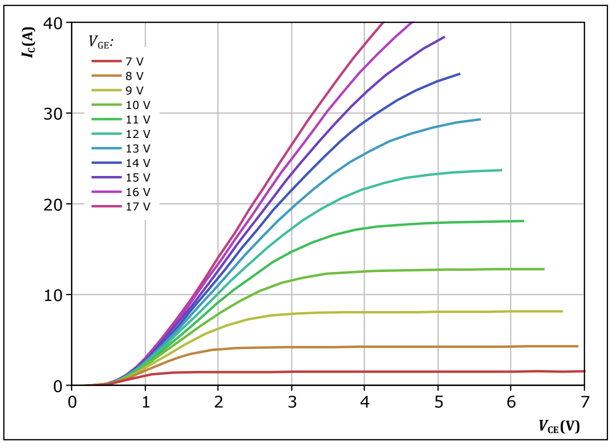


t_p = 250 µs
V_{GE} = 15 V
T_j: 25 °C, 125 °C, 150 °C

figure 9. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

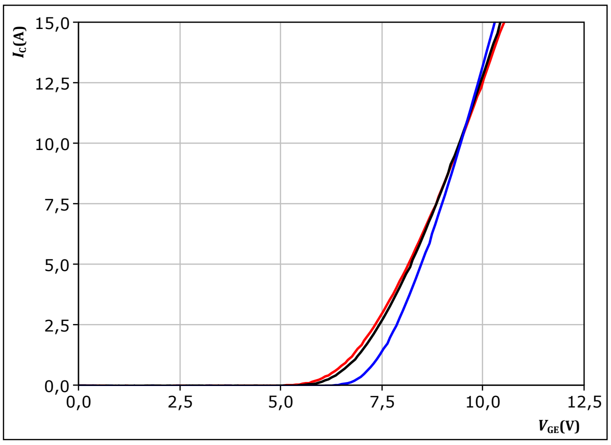


t_p = 250 µs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 10. IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$

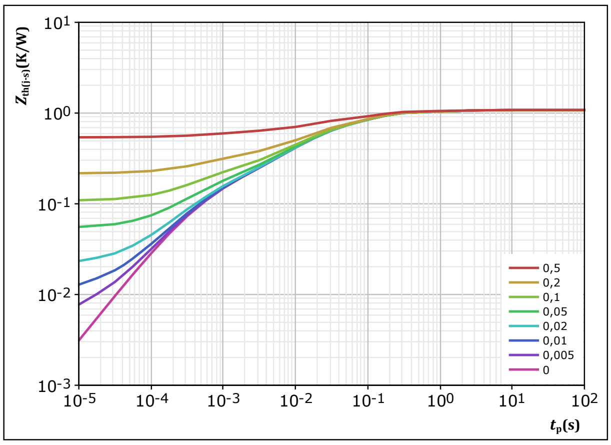


t_p = 250 µs
V_{CE} = 10 V
T_j: 25 °C, 125 °C, 150 °C

figure 11. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
$R_{th(j-s)}$ = 1,08 K/W

IGBT thermal model values

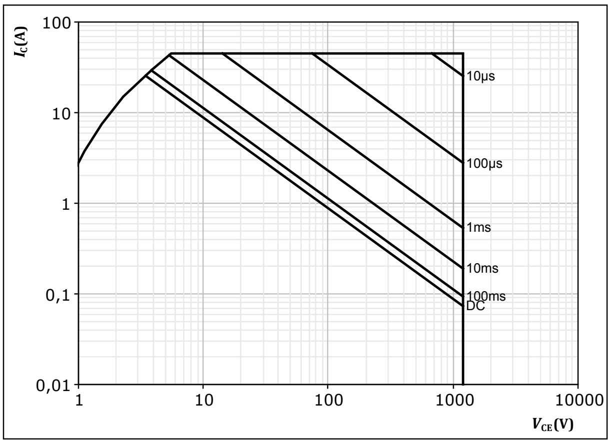
R (K/W)	τ (s)
7,13E-02	1,56E+00
4,66E-01	9,71E-02
3,95E-01	1,21E-02
8,84E-02	1,02E-03
5,92E-02	3,09E-04

Brake Switch Characteristics

figure 12.	IGBT

Safe operating area

I_C = f(V_{CE})



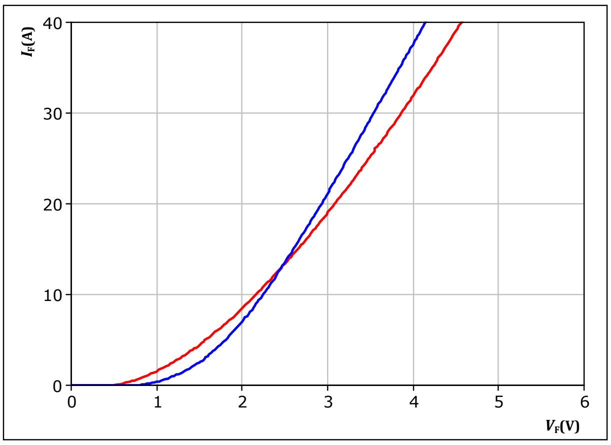
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

Brake Diode Characteristics

figure 13. **FWD**

Typical forward characteristics

I_F = f(V_F)



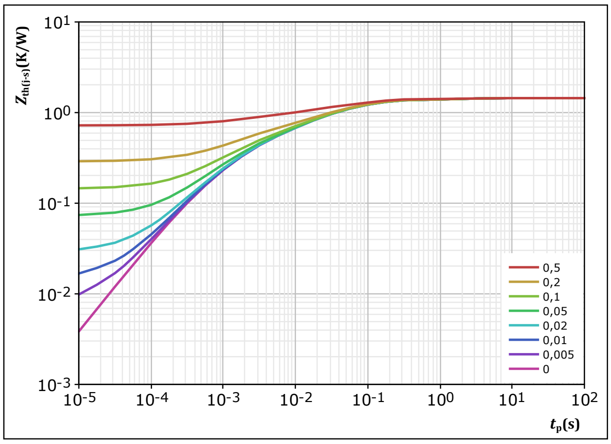
t_p = 250 µs

T_j: 25 °C, 150 °C

figure 14. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,445 K/W

FWD thermal model values

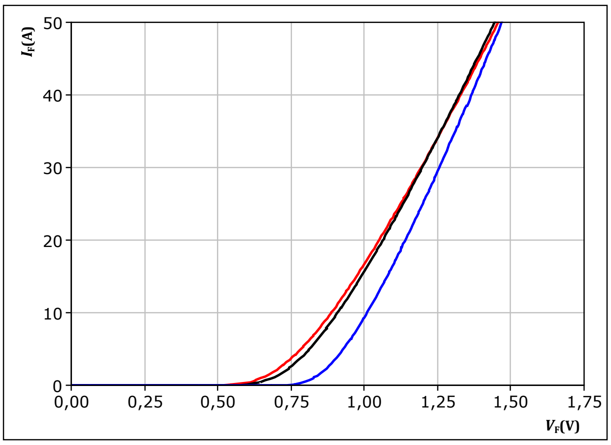
R (K/W)	τ (s)
8,37E-02	1,83E+00
5,67E-01	7,20E-02
4,45E-01	1,17E-02
2,82E-01	1,68E-03
6,71E-02	3,86E-04

Rectifier Diode Characteristics

figure 15. **Rectifier**

Typical forward characteristics

I_F = f(V_F)



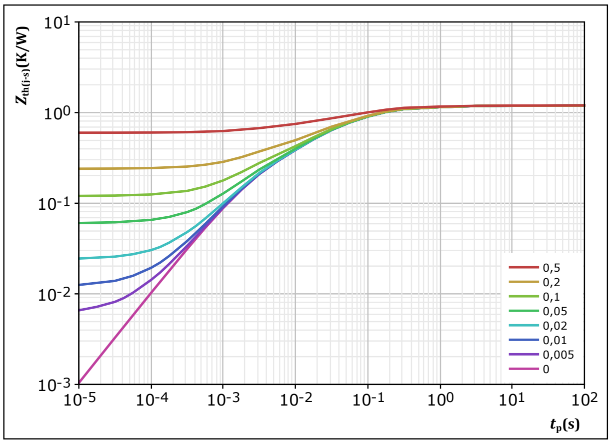
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 16. **Rectifier**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,199 K/W

Rectifier thermal model values

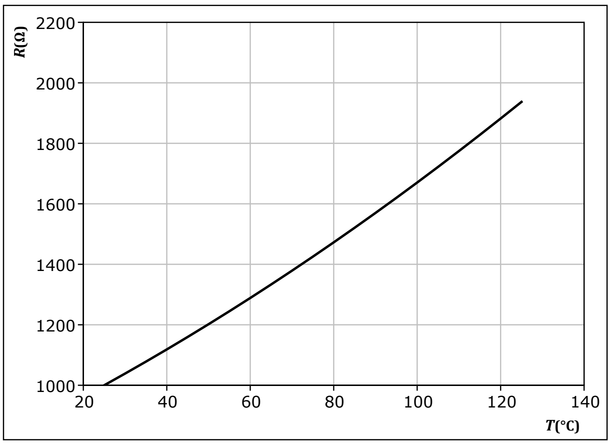
R (K/W)	τ (s)
9,53E-03	3,62E+01
8,81E-02	1,34E+00
5,06E-01	1,09E-01
4,21E-01	1,95E-02
1,75E-01	2,24E-03

Thermistor Characteristics

figure 17.	Thermistor

Typical PTC characteristic as function of temperature

R_T = f(T)

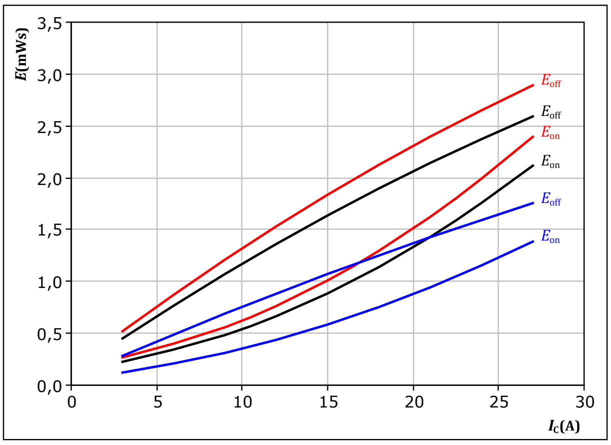


Inverter Switching Characteristics

figure 18. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



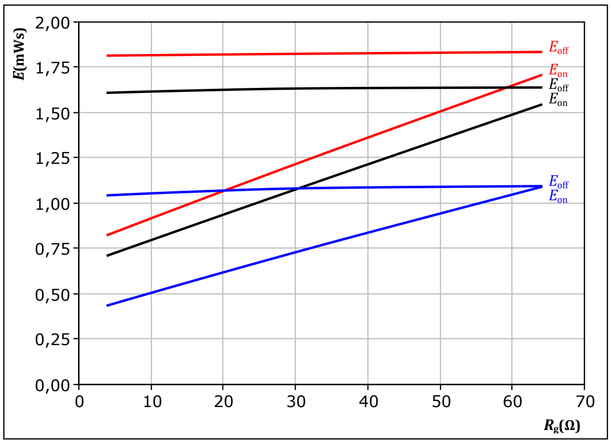
With an inductive load at

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

figure 19. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



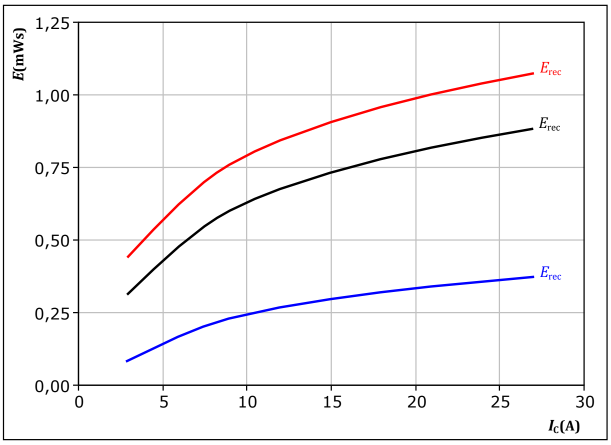
With an inductive load at

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

figure 20. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



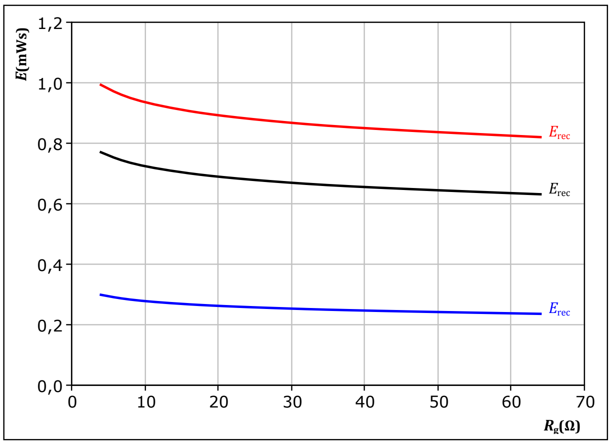
With an inductive load at

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

figure 21. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

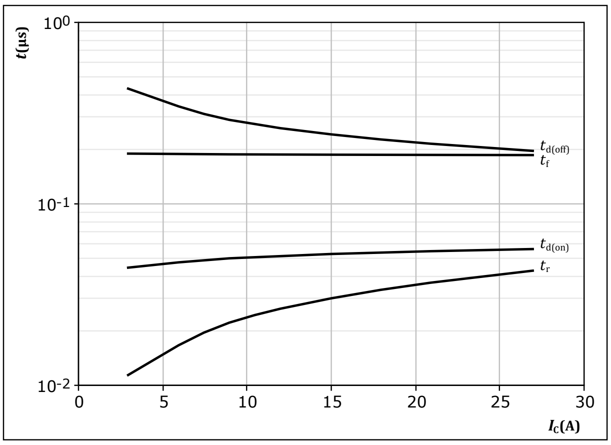
V_{CE} =	600	V	T_j: 25 °C
V_{GE} =	±15	V	125 °C
I_C =	15	A	150 °C

Inverter Switching Characteristics

figure 22. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



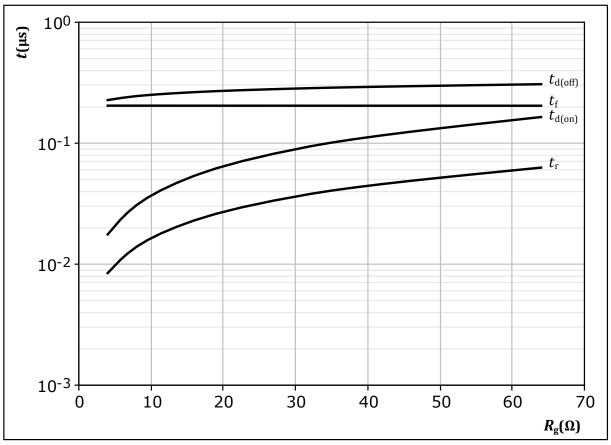
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

figure 23. **IGBT**

Typical switching times as a function of gate resistor

t = f(R_g)



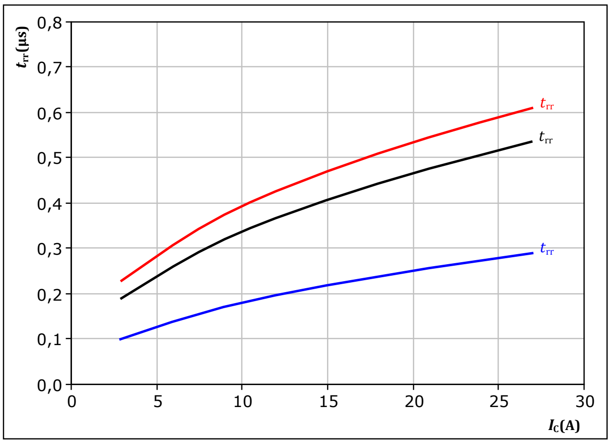
With an inductive load at

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

figure 24. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

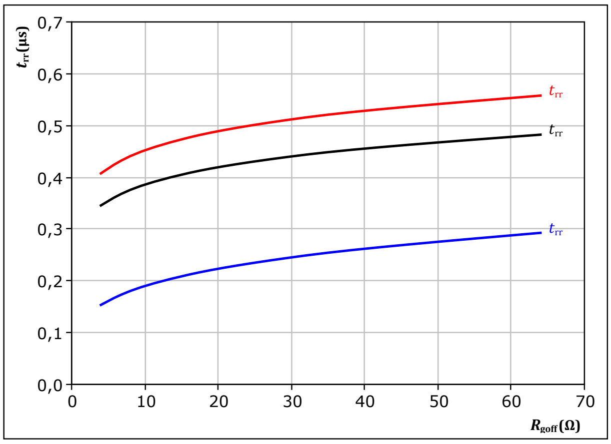
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	16	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 25. **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 =	15	A

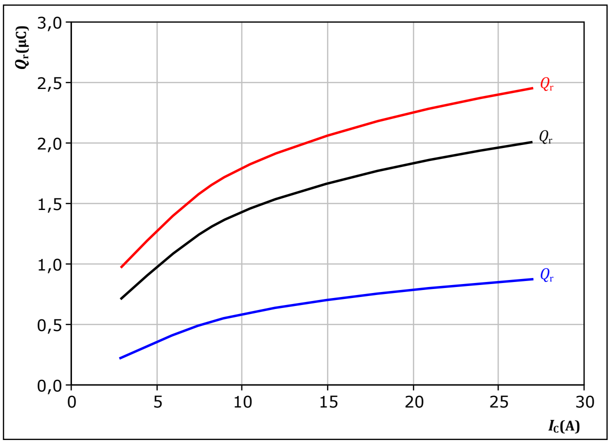
T_j: 25 °C, 125 °C, 150 °C

Inverter Switching Characteristics

figure 26. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



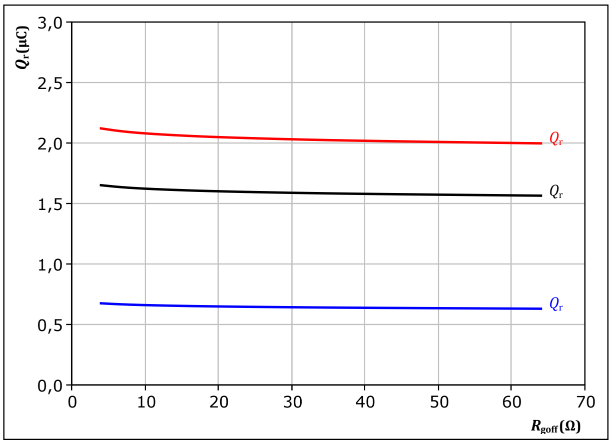
With an inductive load at

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

figure 27. **FWD**

Typical recovered charge as a function of turn off gate resistor

Q_r = f(R_{goff})



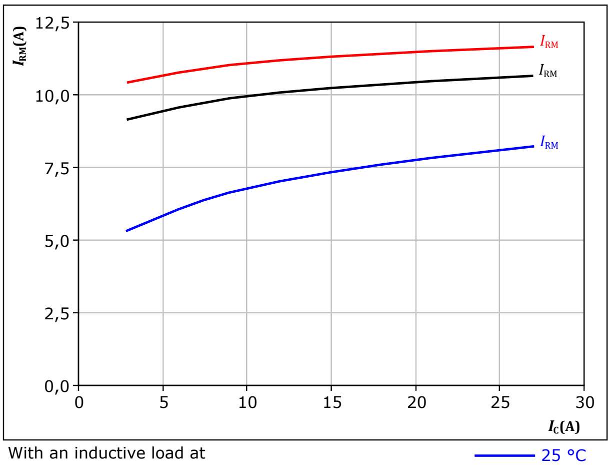
With an inductive load at

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

figure 28. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



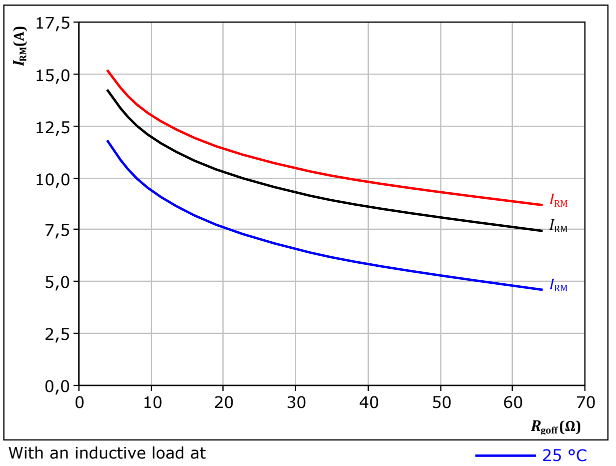
With an inductive load at

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

figure 29. **FWD**

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

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



With an inductive load at

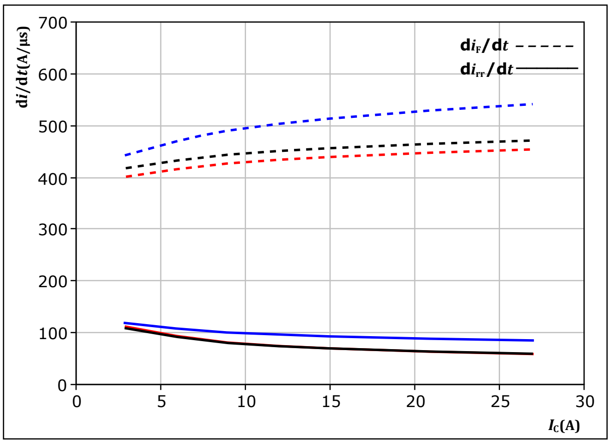
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	15	A		150 °C

Inverter Switching Characteristics

figure 30. **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)



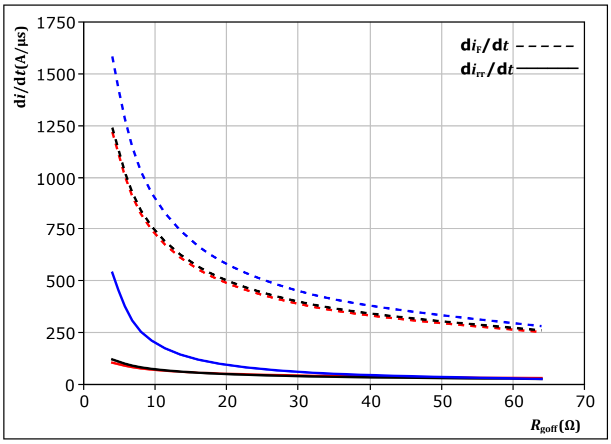
With an inductive load at

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

figure 31. **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})



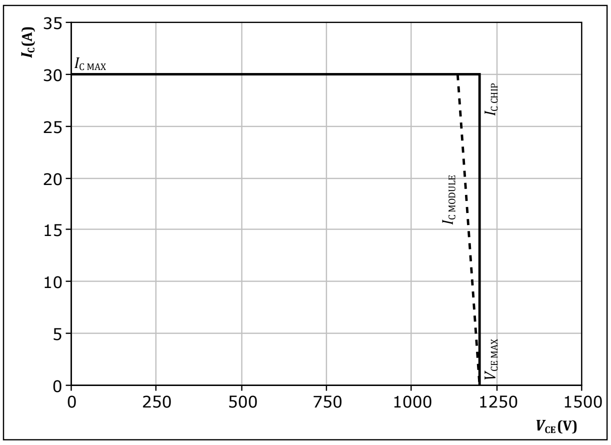
With an inductive load at

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

figure 32. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



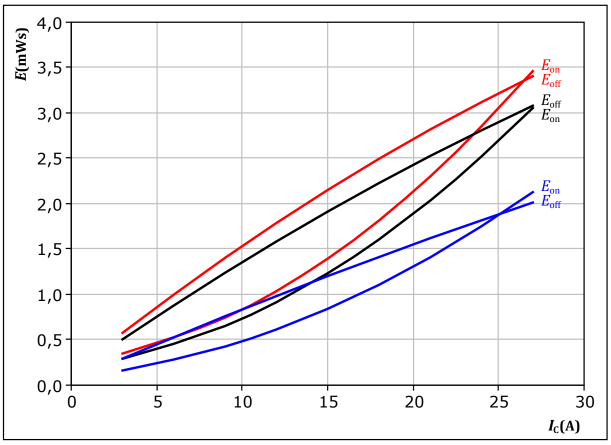
At	T_j =	150	°C
	R_{gon} =	16	Ω
	R_{goff} =	16	Ω

Brake Switching Characteristics

figure 33. **IGBT**

Typical switching energy losses as a function of collector current

E = f(I_C)



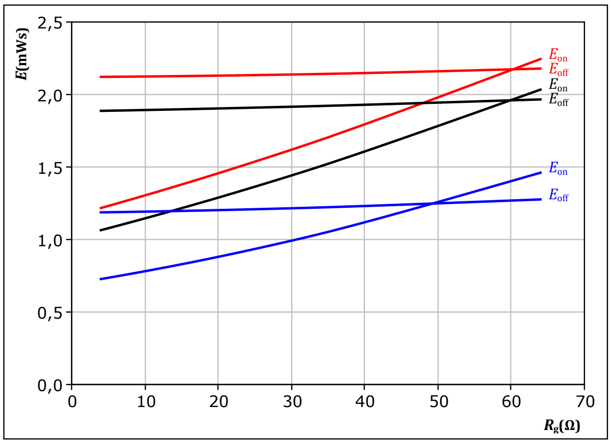
With an inductive load at

V_{CE} =	700	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	0/15	V	
R_{gon} =	16	Ω	
R_{goff} =	16	Ω	

figure 34. **IGBT**

Typical switching energy losses as a function of gate resistor

E = f(R_g)



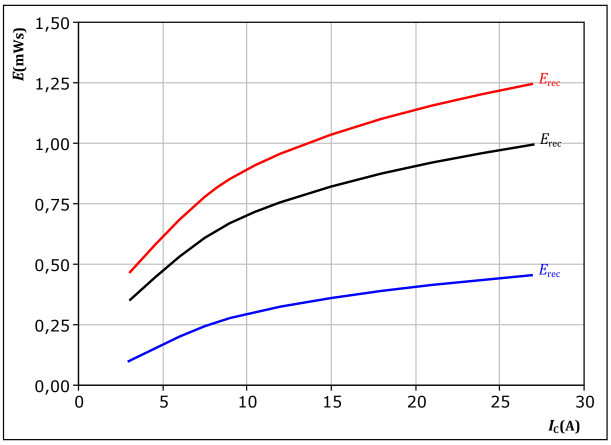
With an inductive load at

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

figure 35. **FWD**

Typical reverse recovered energy loss as a function of collector current

E_{rec} = f(I_C)



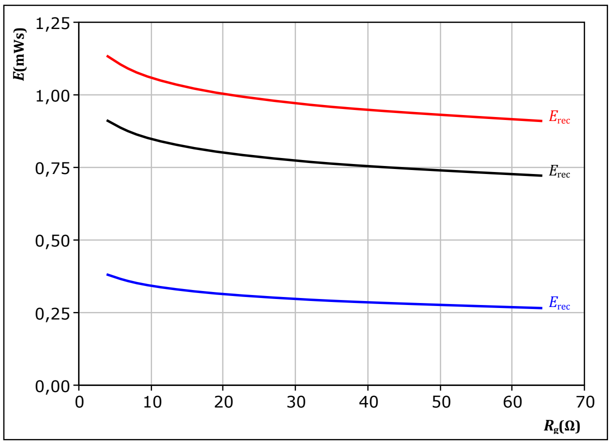
With an inductive load at

V_{CE} =	700	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	0/15	V	
R_{gon} =	16	Ω	

figure 36. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

E_{rec} = f(R_g)



With an inductive load at

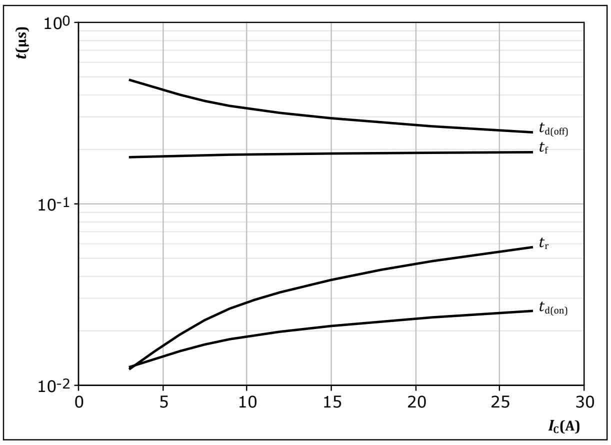
V_{CE} =	700	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	0/15	V	
I_C =	15	A	

Brake Switching Characteristics

figure 37. IGBT

Typical switching times as a function of collector current

t = f(I_C)



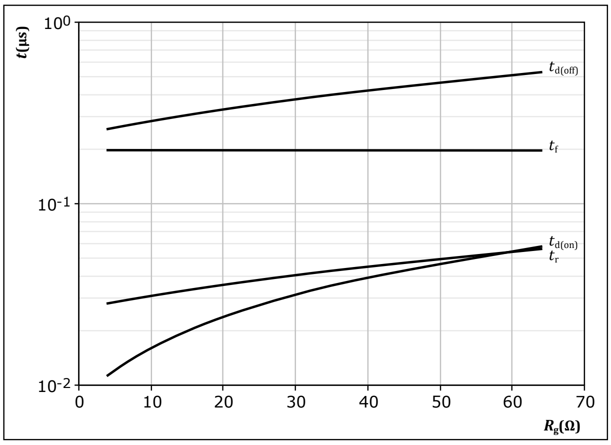
With an inductive load at

T_j =	150	°C
V_{CE} =	700	V
V_{GE} =	0/15	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

figure 38. IGBT

Typical switching times as a function of gate resistor

t = f(R_g)



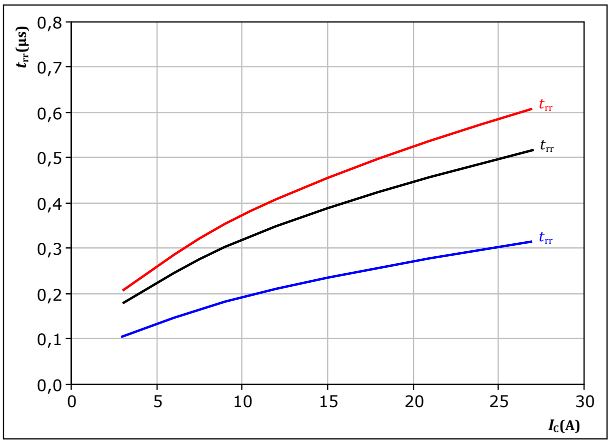
With an inductive load at

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

figure 39. FWD

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

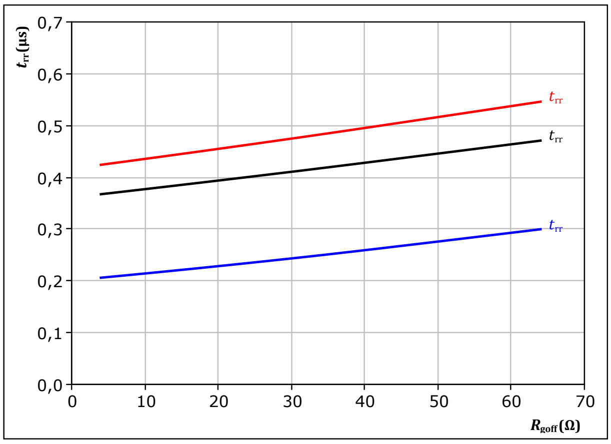
V_{CE} =	700	V
V_{GE} =	0/15	V
R_{gon} =	16	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 40. 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 =	15	A

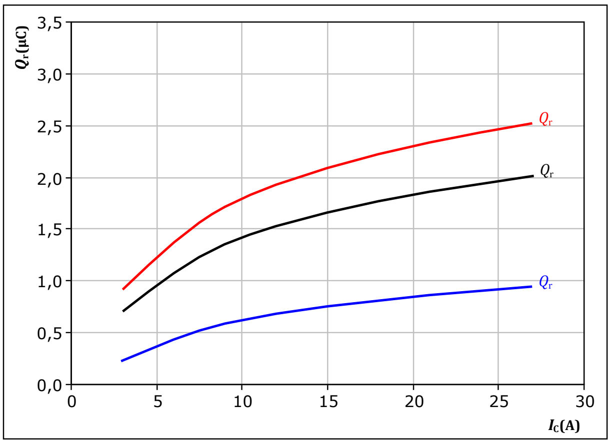
T_j: 25 °C, 125 °C, 150 °C

Brake Switching Characteristics

figure 41. FWD

Typical recovered charge as a function of collector current

Q_r = f(I_C)



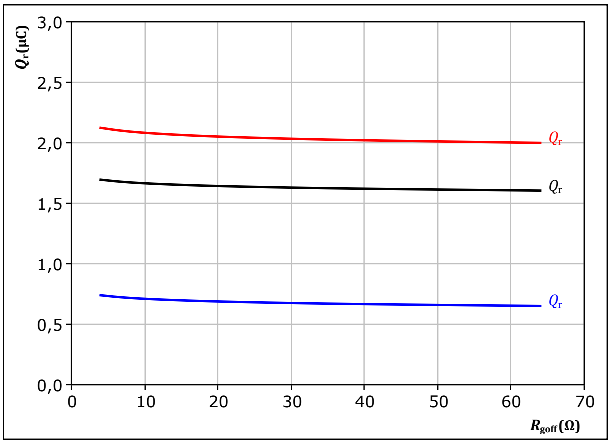
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	0/15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 42. FWD

Typical recovered charge as a function of turn off gate resistor

Q_r = f(R_{goff})



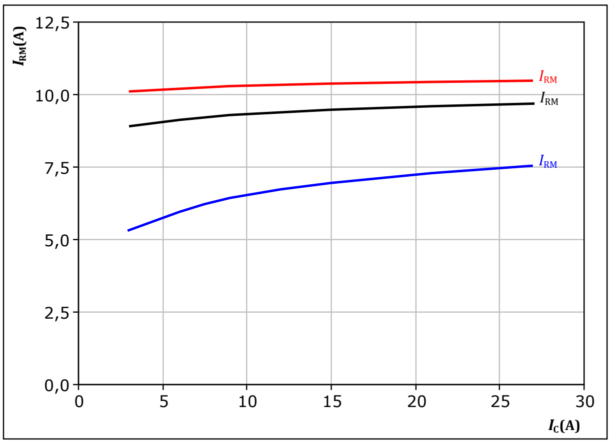
With an inductive load at

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

figure 43. FWD

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



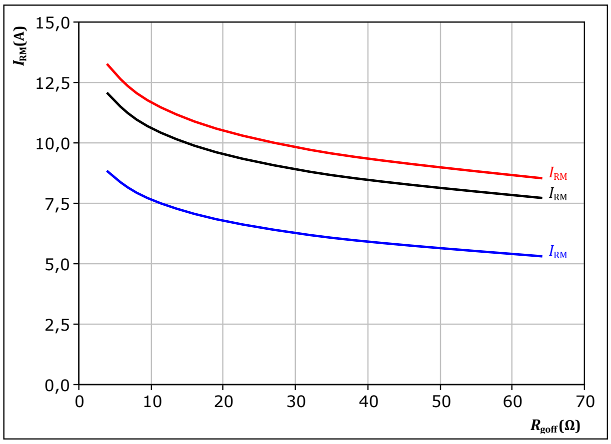
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	0/15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 44. FWD

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

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



With an inductive load at

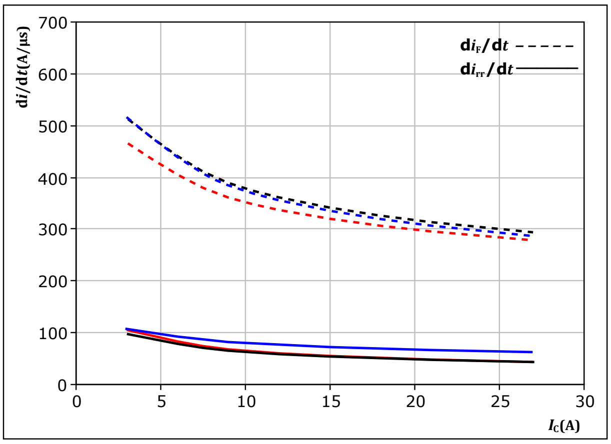
V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	0/15	V		125 °C
I_C =	15	A		150 °C

Brake Switching Characteristics

figure 45. **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)



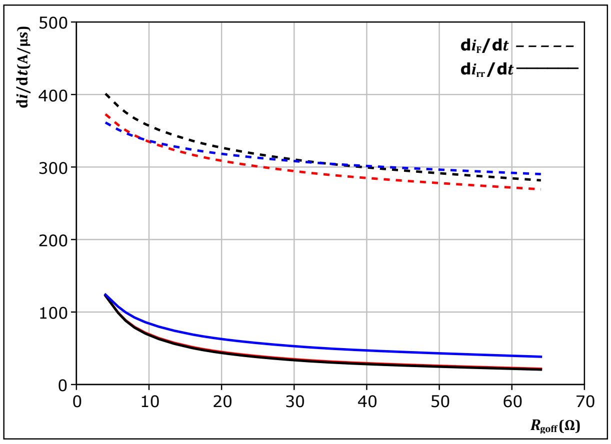
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	0/15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 46. **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})



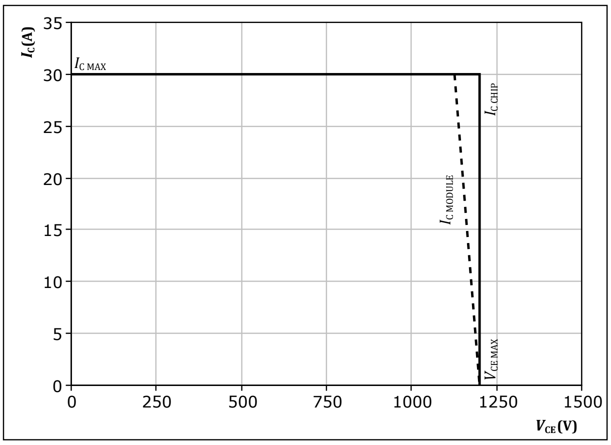
With an inductive load at

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

figure 47. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



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

Switching Definitions

figure 48. **IGBT**

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

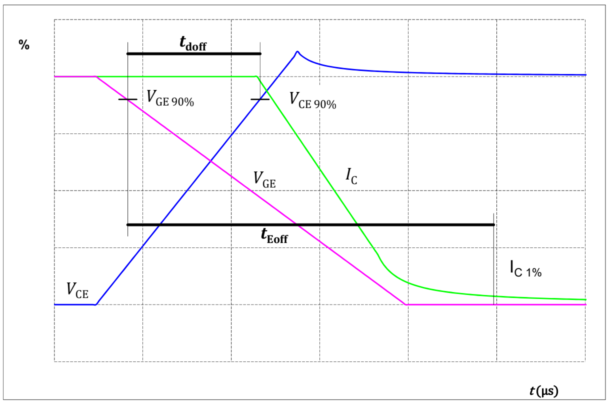


figure 49. **IGBT**

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

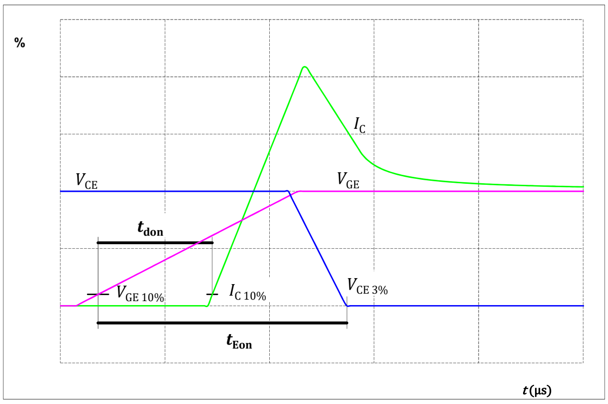


figure 50. **IGBT**

Turn-off Switching Waveforms & definition of t_f

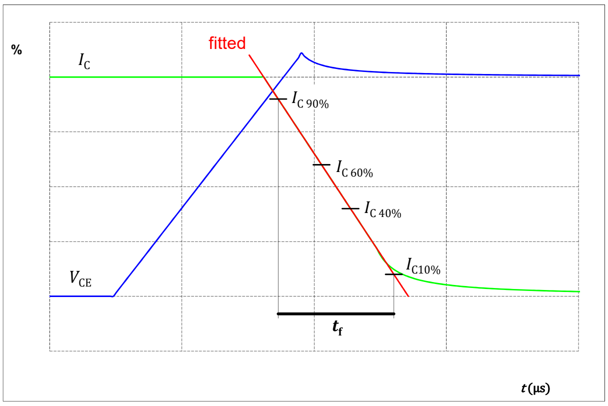
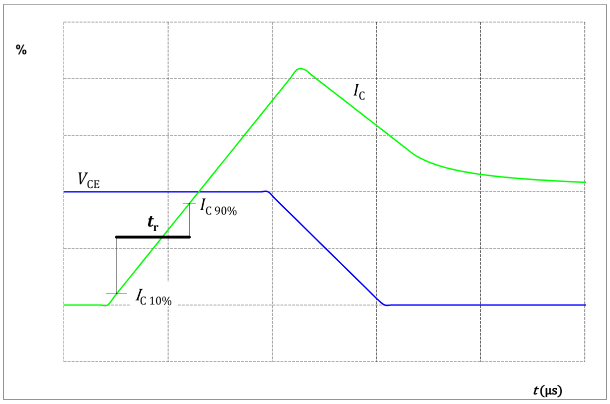


figure 51. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Switching Definitions

figure 52.	FWD

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

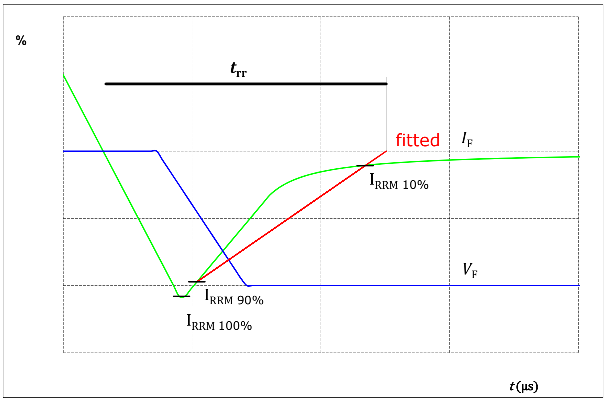
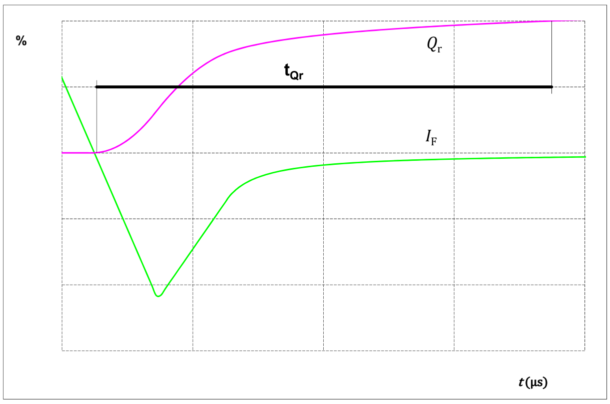


figure 53.	FWD

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



Ordering Code

Version	Ordering Code
With std lid (6.5mm height) + no thermal grease	80-M212PMB015SC-K228A42-/0A/
With thin lid (2.8mm height) + no thermal grease	80-M212PMB015SC-K228A42-/0B/
With std lid (6.5mm height) + thermal grease (0,8 W/mK, P12, silicone-based)	80-M212PMB015SC-K228A42-/1A/
With thin lid (2.8mm height) + thermal grease (0,8 W/mK, P12, silicone-based)	80-M212PMB015SC-K228A42-/1B/
With std lid (6.5mm height) + thermal grease (2,5 W/mK, TG20032, silicone-free)	80-M212PMB015SC-K228A42-/4A/
With thin lid (2.8mm height) + thermal grease (2,5 W/mK, TG20032, silicone-free)	80-M212PMB015SC-K228A42-/4B/
With std lid (6.5mm height) + thermal grease (2,5 W/mK, HPTP, silicone-based)	80-M212PMB015SC-K228A42-/5A/
With thin lid (2.8mm height) + thermal grease (2,5 W/mK, HPTP, silicone-based)	80-M212PMB015SC-K228A42-/5B/

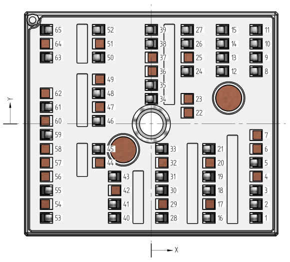
Marking

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

Outline

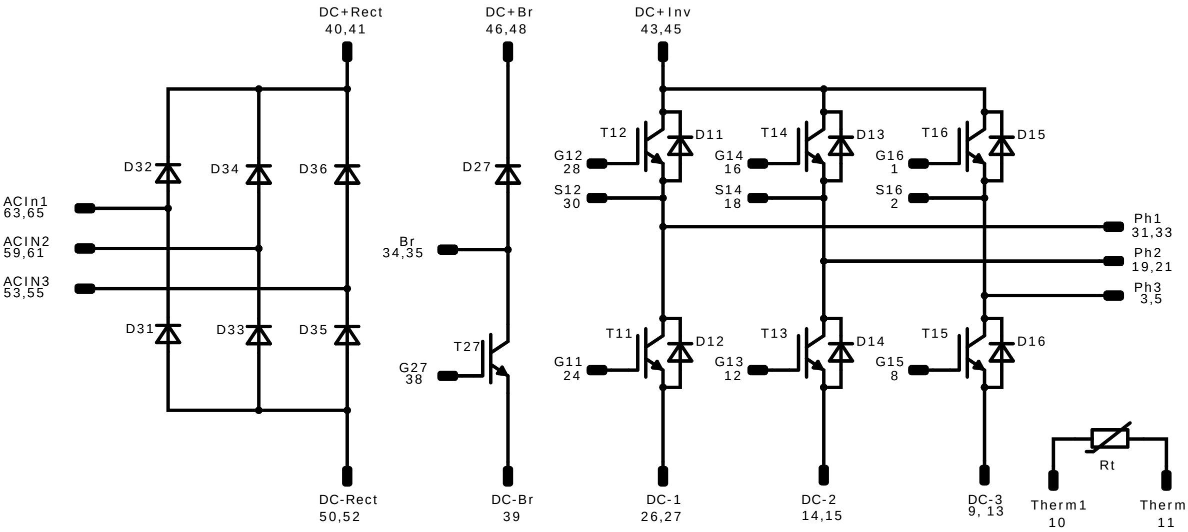
Pin table [mm]

Pin	X	Y	Function	Pin	X	Y	Function
1	24,38	-21,8	G16	34	-0,01	5,85	Br
2	24,38	-18,6	S16	35	-0,01	9,05	Br
3	24,38	-15,4	Ph3	36	not assembled		
4	not assembled			37	not assembled		
5	24,38	-9	Ph3	38	-0,01	18,65	G27
6	not assembled			39	0,03	21,8	DC-Br
7	not assembled			40	-8,5	-21,8	DC+Rect
8	24,38	12,2	G15	41	-8,5	-18,6	DC+Rect
9	24,38	15,4	DC-3	42	not assembled		
10	24,38	18,6	Therm1	43	-8,5	-12,2	DC+Inv
11	24,38	21,8	Therm2	44	not assembled		
12	16,58	12,2	G13	45	-12,22	-5,8	DC+Inv
13	16,58	15,4	DC-3	46	-12,22	0,7	DC+Br
14	16,58	18,6	DC-2	47	not assembled		
15	16,58	21,8	DC-2	48	-12,22	7,1	DC+Br
16	13,42	-21,8	G14	49	not assembled		
17	not assembled			50	-12,22	15,4	DC-Rect
18	13,42	-15,4	S14	51	not assembled		
19	13,42	-12,2	Ph2	52	-12,22	21,8	DC-Rect
20	not assembled			53	-24,38	-21,8	ACIn3
21	13,42	-5,8	Ph2	54	not assembled		
22	not assembled			55	-24,38	-15,4	ACIn3
23	not assembled			56	not assembled		
24	8,38	12,2	G11	57	not assembled		
25	not assembled			58	not assembled		
26	8,38	18,6	DC-1	59	-24,38	-2,5	ACIn2
27	8,38	21,8	DC-1	60	not assembled		
28	2,46	-21,8	G12	61	-24,38	3,9	ACIn2
29	not assembled			62	not assembled		
30	2,46	-15,4	S12	63	-24,38	15,4	ACIn1
31	2,46	-12,2	Ph1	64	not assembled		
32	not assembled			65	-24,38	21,8	ACIn1
33	2,46	-5,8	Ph1				



Pad positions refers to center point. For more informations on pad design please see package data

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14, T15, T16	IGBT	1200 V	15 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	FWD	1200 V	15 A	Inverter Diode	
T27	IGBT	1200 V	15 A	Brake Switch	
D27	FWD	1200 V	15 A	Brake Diode	
D31, D32, D33, D34, D35, D36	Rectifier	1600 V	18 A	Rectifier Diode	
Rt	Thermistor			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 72	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for MiniSKiiP® 2 packages see vincotech.com website.

Package data
Package data for MiniSKiiP® 2 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
80-M212PMB015SC-K228A42-D1-14	26 Jul. 2021		