B0-EP12PMA100M7-PE89A68T
datasheet

***flow*PIM E3** **1200 V / 100 A**

Topology features

- Converter+Brake+Inverter
- Kelvin Emitter for improved switching performance
- Open Emitter configuration
- Temperature sensor

Component features

- Easy paralleling
- Low turn-off losses
- Low collector emitter saturation voltage
- Positive temperature coefficient
- Short tail current
- Switching optimized for EMC

Housing features

- Base isolation: Al_2O_3
- CTI600 housing material
- Compact, baseplate-less housing
- VINcoPress Technology
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

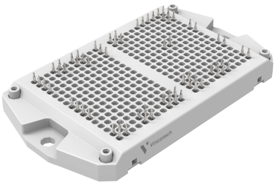
Target applications

- General Purpose Drives
- Industrial Drives

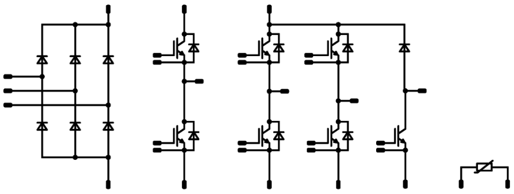
Types

- B0-EP12PMA100M7-PE89A68T

flow E3 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	92	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	174	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	70	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	121	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	60	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	100	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	124	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

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	36	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	71	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	105	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	119	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	6000	V
Isolation voltage	V_{isol}	AC Voltage t_p = 1 min	2500	V
Creepage distance			>12,7	mm
Clearance			9,85	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	
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		1,61 1,82 1,91	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			200	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}		0	10		25		21000		pF
Output capacitance	C_{oes}							700		pF
Reverse transfer capacitance	C_{res}							280		pF
Gate charge	Q_g	V_{CC} = 600 V	0/15		100	25		700		nC
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,55		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	±15	600	100	25 125 150		171,48 170,07 170,74		ns
Rise time	t_r					25 125 150		43,95 48,13 48,68		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		180,96 205,98 211,67		ns
Fall time	t_f					25 125 150		79,94 103,73 106,97		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=8,03 µC Q_{rFWD}=12,71 µC Q_{rFWD}=14,17 µC				25 125 150		8,11 10,32 10,98		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		7,27 9,97 10,68		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)	$R_{th(j\text{-}s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,79		K/W
Dynamic										
Peak recovery current	I_{RM}	di/dt=1914 A/µs di/dt=1727 A/µs di/dt=1638 A/µs	±15	600	100	25 125 150		65,79 72,68 75,18		A
Reverse recovery time	t_{rr}					25 125 150		276,98 420,88 458,99		ns
Recovered charge	Q_r					25 125 150		8,03 12,71 14,17		µC
Reverse recovered energy	E_{rec}					25 125 150		2,85 4,83 5,43		mWs
Peak rate of fall of recovery current	$(\mathrm{d}i_{rf}/\mathrm{d}t)_{max}$					25 125 150		704,7 494,51 472,28		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 Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$			10	0,005	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		50	25 125 150		1,55 1,77 1,83	1,9(1)	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			0,09	mA
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		10000		pF
Output capacitance	C_{oes}							350		pF
Reverse transfer capacitance	C_{res}							130		pF
Gate charge	Q_g	V_{CC} = 600 V	0/15		50	25		380		nC
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,77		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 8 Ω R_{goff} = 8 Ω	0/15	700	50	25 125 150		77,46 74,38 72,91		ns
Rise time	t_r					25 125 150		43,86 46,64 47,83		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		293,47 329,61 338,69		ns
Fall time	t_f					25 125 150		91,96 120,11 133,54		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=3,21 µC Q_{rFWD}=4,61 µC Q_{rFWD}=5,06 µC				25 125 150		4,2 5,04 5,32		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		4,58 6,44 6,94		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	
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} = 5,2 W/mK (PTM)						1,34		K/W
Dynamic										
Peak recovery current	I_{RM}	di/dt=1004 A/µs di/dt=898 A/µs di/dt=920 A/µs	0/15	700	50	25 125 150		28,04 30,12 30,87		A
Reverse recovery time	t_{rr}					25 125 150		244,53 350,17 380,42		ns
Recovered charge	Q_r					25 125 150		3,21 4,61 5,06		µC
Reverse recovered energy	E_{rec}					25 125 150		1,36 2,07 2,29		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		299,69 211,89 204,8		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	
Rectifier Diode										
Static										
Forward voltage	V_F				60	25 125 150		1,06 0,99 0,97	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} = 5,2 W/mK (PTM)						0,59		K/W
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					25		130		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

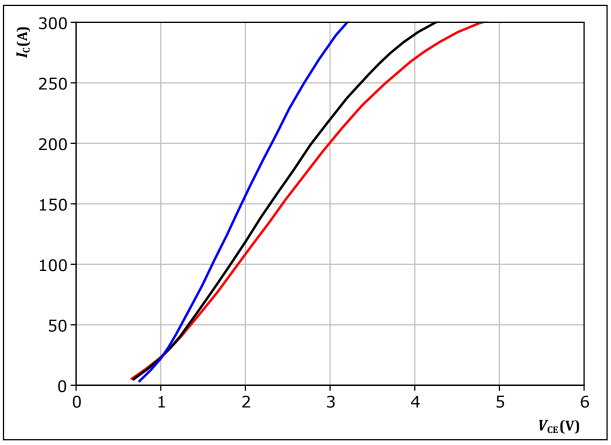
(2) Only valid with pre-applied Vincotech thermal interface material.

Inverter Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

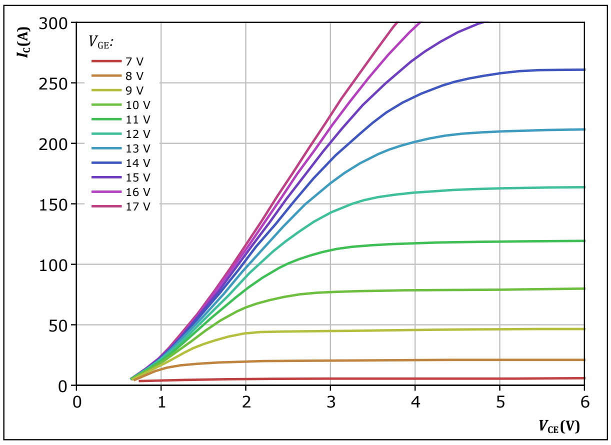


t_p = 250 µs
V_{GE} = 15 V
T_j:
25 °C
125 °C
150 °C

figure 2. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

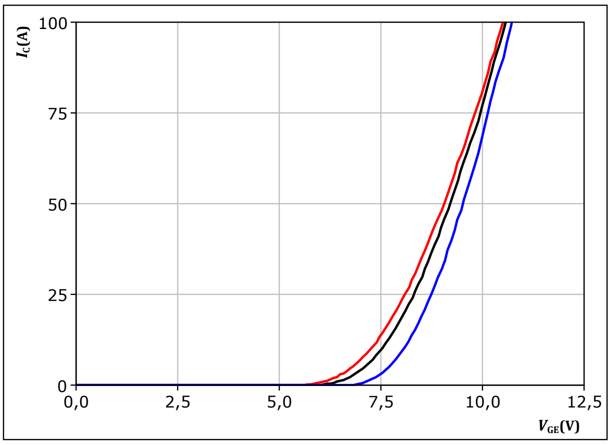


t_p = 250 µs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})

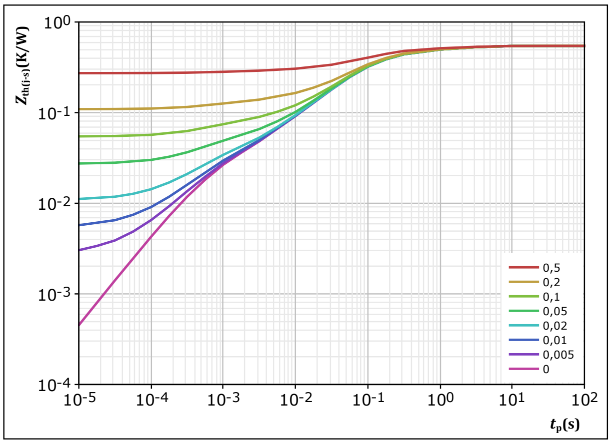


t_p = 250 µs
V_{CE} = 10 V
T_j:
25 °C
125 °C
150 °C

figure 4. **IGBT**

Transient thermal impedance as a function of pulse width

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



D = t_p / T
$R_{th(j-s)}$ = 0,545 K/W

IGBT thermal model values

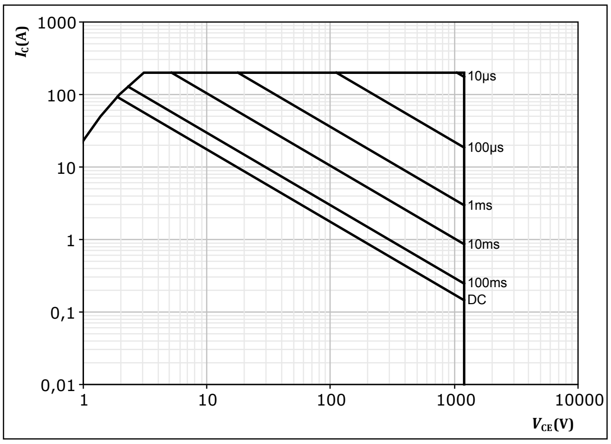
R (K/W)	τ (s)
5,00E-02	2,85E+00
9,49E-02	5,03E-01
2,74E-01	9,38E-02
8,25E-02	3,17E-02
2,20E-02	5,55E-03
2,13E-02	5,96E-04

Inverter Switch Characteristics

figure 5. **IGBT**

Safe operating area

I_C = f(V_{CE})

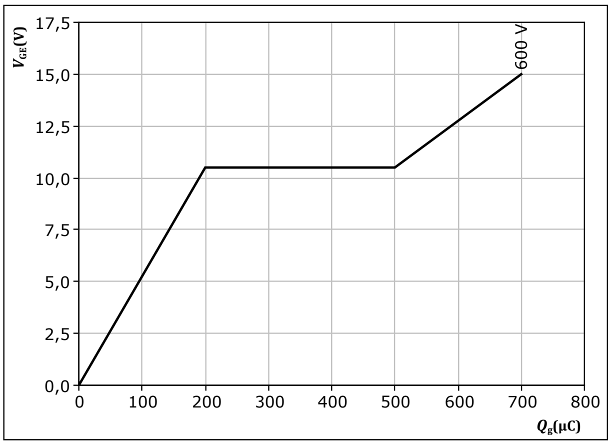


D = single pulse
T_s = 80 °C
V_{GE} = 15 V
T_j = T_{jmax}

figure 6. **IGBT**

Gate voltage vs gate charge

V_{GE} = f(Q_g)



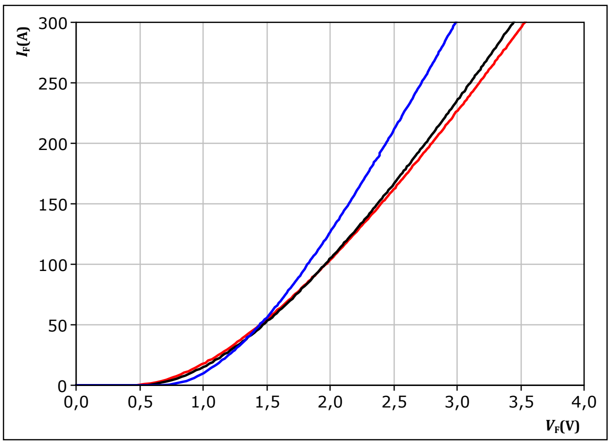
I_C = 100 A
T_j = 25 °C

Inverter Diode Characteristics

figure 7. **FWD**

Typical forward characteristics

I_F = f(V_F)



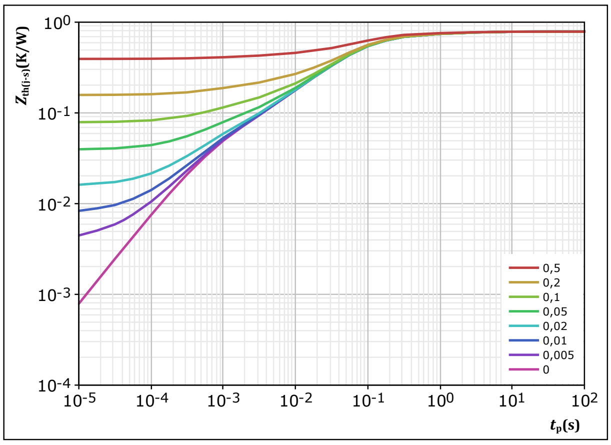
t_p = 250 µs

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

$R_{th(j-s)}$ = 0,787 K/W

FWD thermal model values

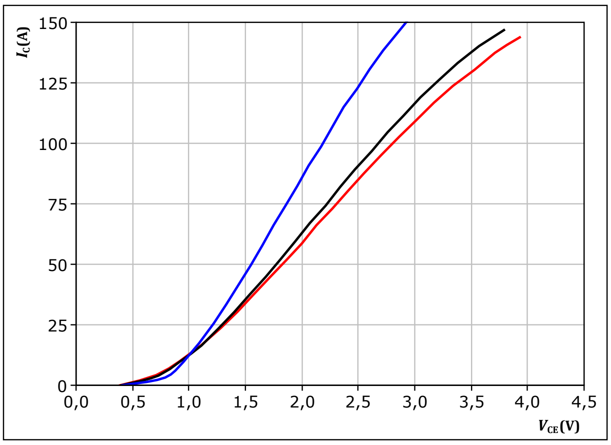
R (K/W)	τ (s)
4,05E-02	3,25E+00
9,02E-02	5,38E-01
3,71E-01	8,95E-02
1,97E-01	3,04E-02
5,23E-02	4,59E-03
3,58E-02	6,26E-04

Brake Switch Characteristics

figure 9. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



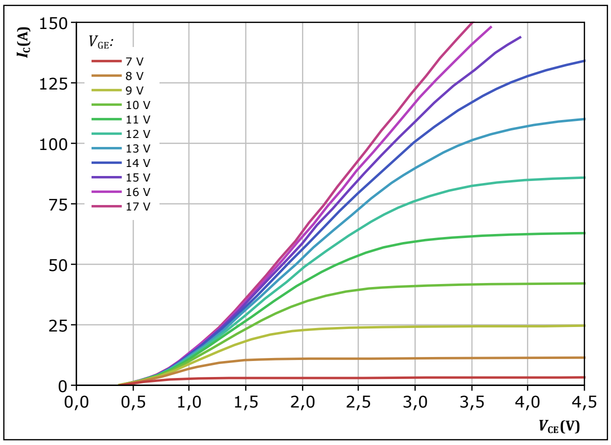
t_p = 250 µs
V_{GE} = 15 V

T_j:
— 25 °C
— 125 °C
— 150 °C

figure 10. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

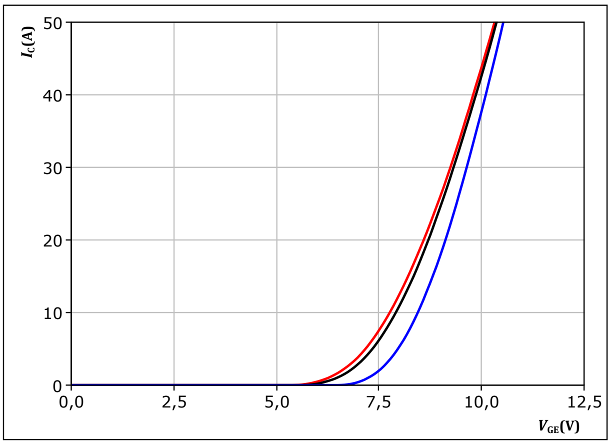


t_p = 250 µs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 11. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})



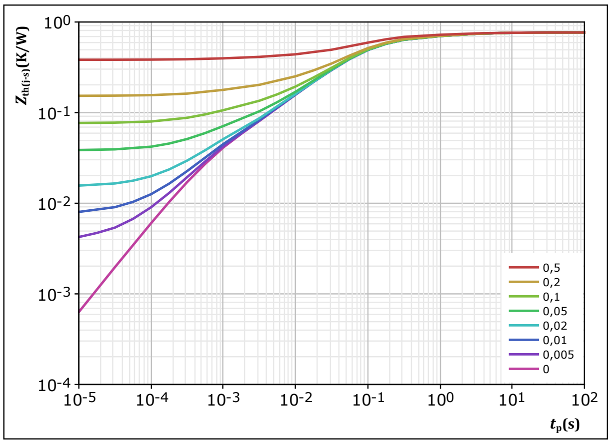
t_p = 250 µs
V_{CE} = 10 V

T_j:
— 25 °C
— 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
$R_{th(j-s)}$ = 0,766 K/W

IGBT thermal model values

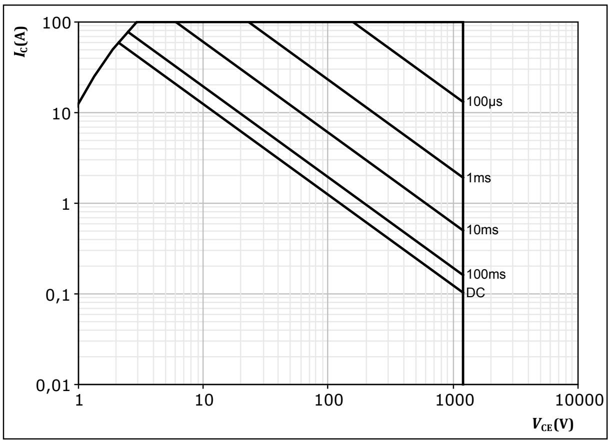
R (K/W)	τ (s)
4,42E-02	4,45E+00
9,11E-02	9,15E-01
2,73E-01	1,28E-01
2,59E-01	4,34E-02
6,73E-02	6,94E-03
3,15E-02	6,91E-04

Brake Switch Characteristics

figure 13. **IGBT**

Safe operating area

I_C = f(V_{CE})

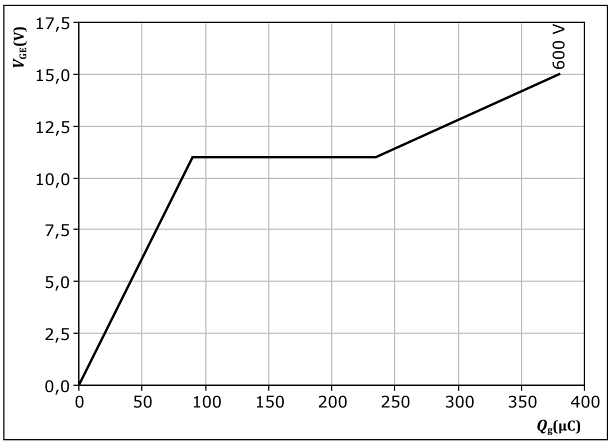


D = single pulse
T_s = 80 °C
V_{GE} = 15 V
T_j = T_{jmax}

figure 14. **IGBT**

Gate voltage vs gate charge

V_{GE} = f(Q_g)



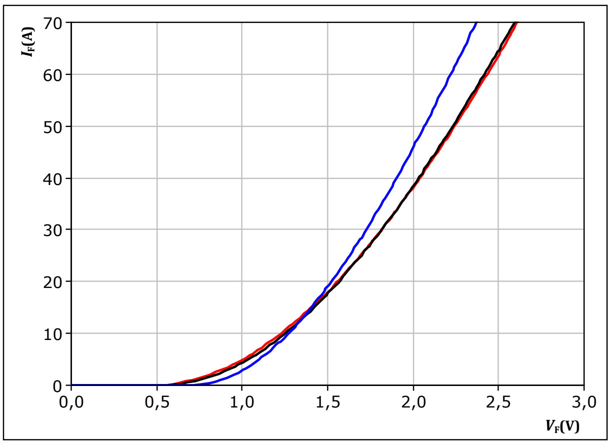
I_C = 50 A
T_j = 25 °C

Brake Diode Characteristics

figure 15. **FWD**

Typical forward characteristics

I_F = f(V_F)



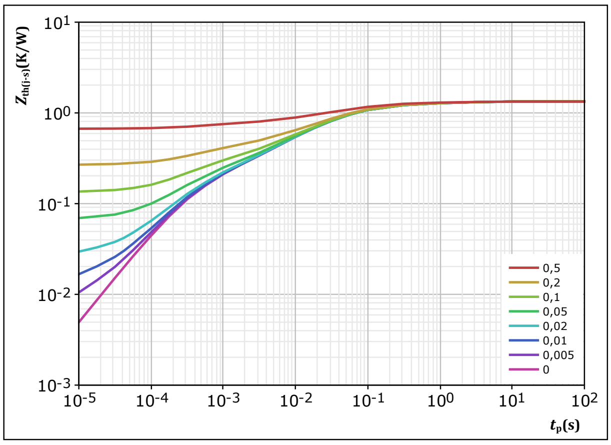
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 16. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,335 K/W

FWD thermal model values

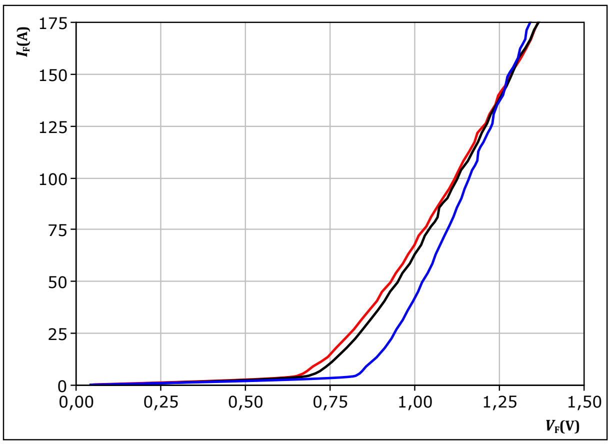
R (K/W)	τ (s)
7,90E-02	2,29E+00
1,38E-01	2,89E-01
5,15E-01	5,53E-02
3,34E-01	1,22E-02
1,30E-01	2,48E-03
1,40E-01	3,42E-04

Rectifier Diode Characteristics

figure 17. **Rectifier**

Typical forward characteristics

I_F = f(V_F)



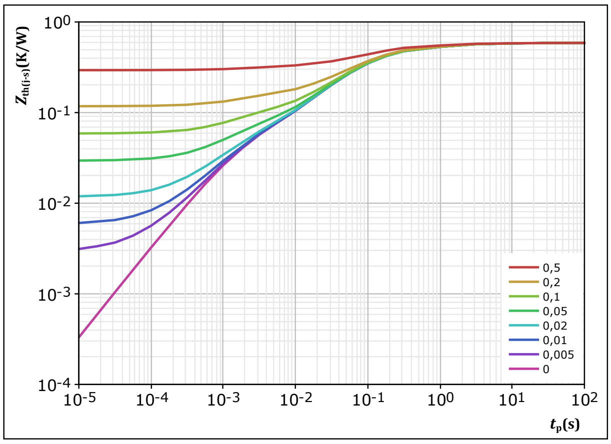
t_p = 250 µs

T_j:
25 °C
125 °C
150 °C

figure 18. **Rectifier**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,587 K/W

Rectifier thermal model values

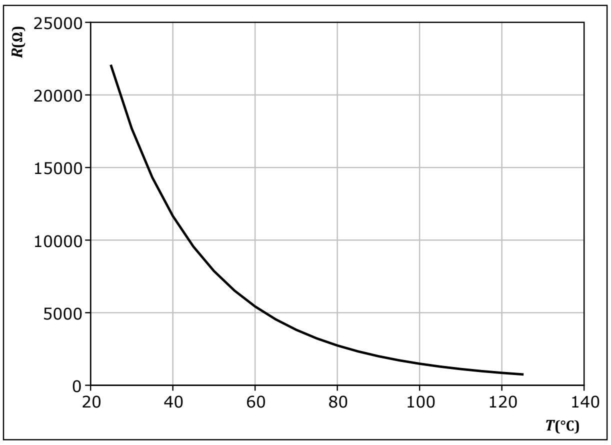
R (K/W)	τ (s)
1,76E-02	1,19E+01
1,01E-01	1,09E+00
3,04E-01	1,13E-01
1,25E-01	2,75E-02
4,00E-02	1,55E-03

Thermistor Characteristics

figure 19. **Thermistor**

Typical NTC characteristic as function of temperature

$R_T = f(T)$

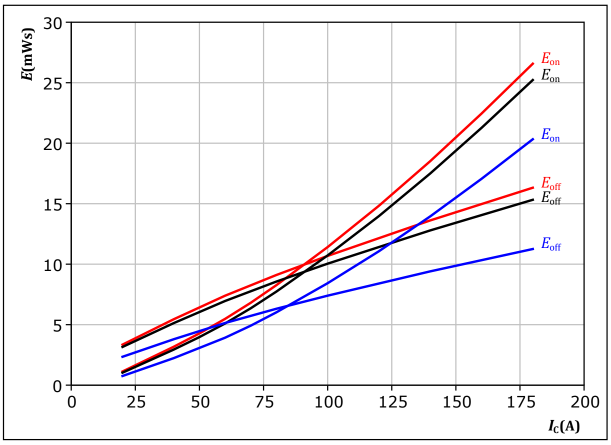


Inverter Switching Characteristics

figure 20. **IGBT**

Typical switching energy losses as a function of collector current

E = f(I_C)



With an inductive load at

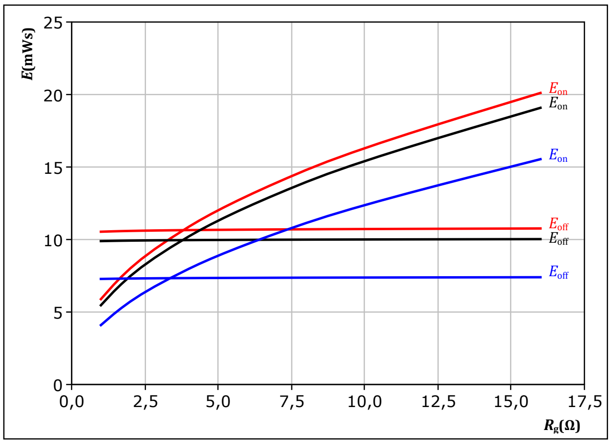
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 4 Ω
R_{goff} = 4 Ω

T_j: 25 °C / 125 °C / 150 °C

figure 21. **IGBT**

Typical switching energy losses as a function of IGBT turn on gate resistor

E = f(R_g)



With an inductive load at

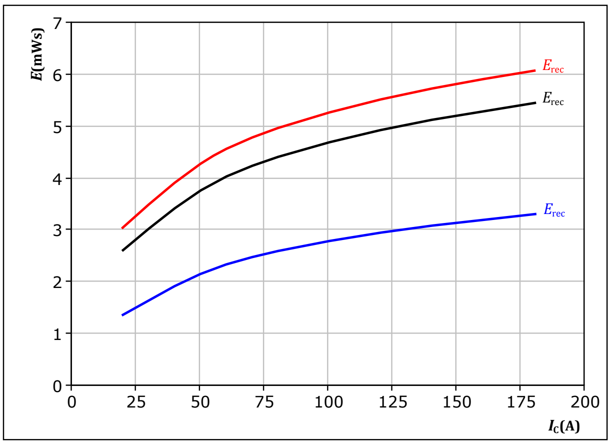
V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 100 A

T_j: 25 °C / 125 °C / 150 °C

figure 22. **FWD**

Typical reverse recovered energy loss as a function of collector current

E_{rec} = f(I_C)



With an inductive load at

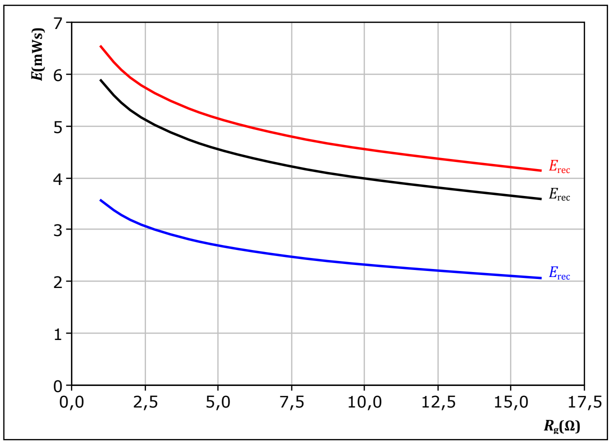
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 4 Ω

T_j: 25 °C / 125 °C / 150 °C

figure 23. **FWD**

Typical reverse recovered energy loss as a function of IGBT turn on gate resistor

E_{rec} = f(R_g)



With an inductive load at

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

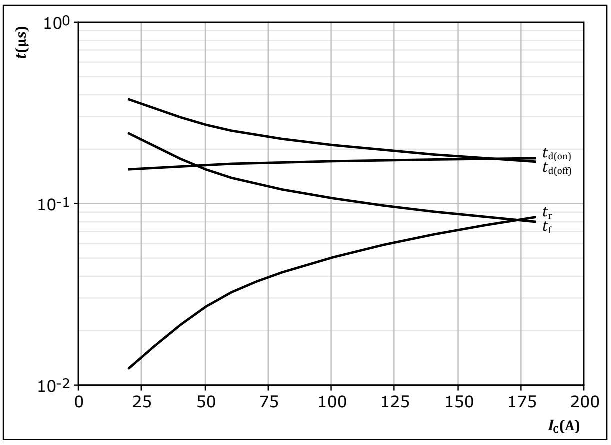
T_j: 25 °C / 125 °C / 150 °C

Inverter Switching Characteristics

figure 24. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



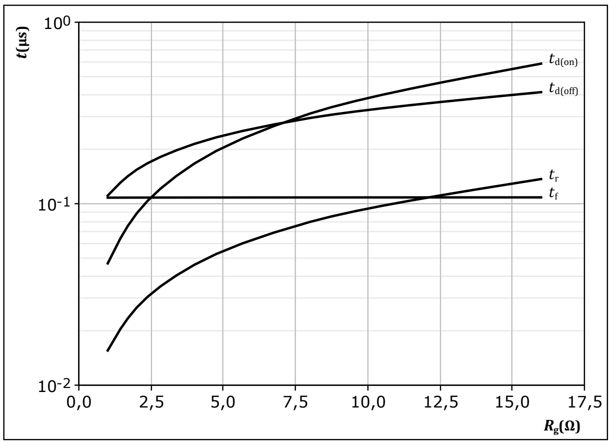
With an inductive load at

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

figure 25. **IGBT**

Typical switching times as a function of IGBT turn on gate resistor

t = f(R_g)



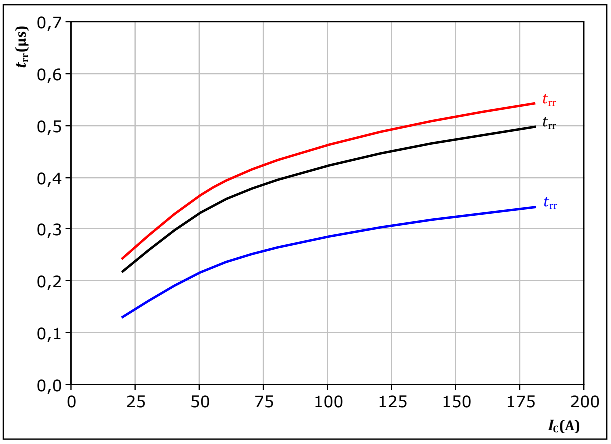
With an inductive load at

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

figure 26. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

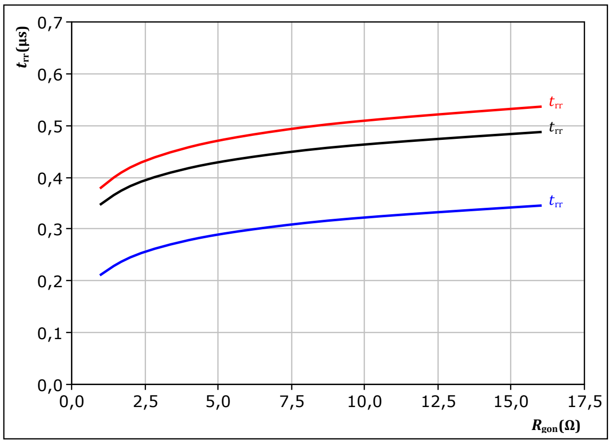
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 4 Ω

T_j:
- 25 °C
- 125 °C
- 150 °C

figure 27. **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} = ±15 V
I_C = 100 A

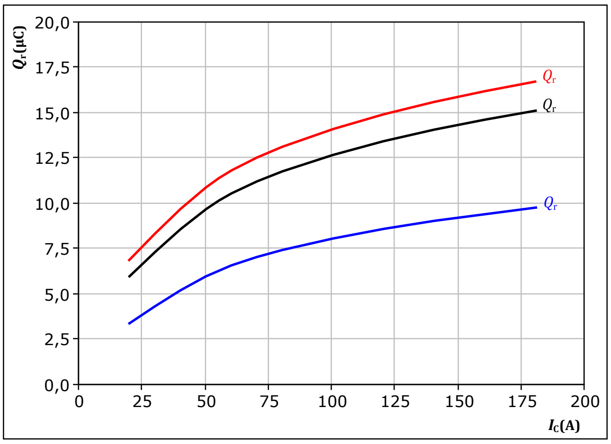
T_j:
- 25 °C
- 125 °C
- 150 °C

Inverter Switching Characteristics

figure 28. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



With an inductive load at

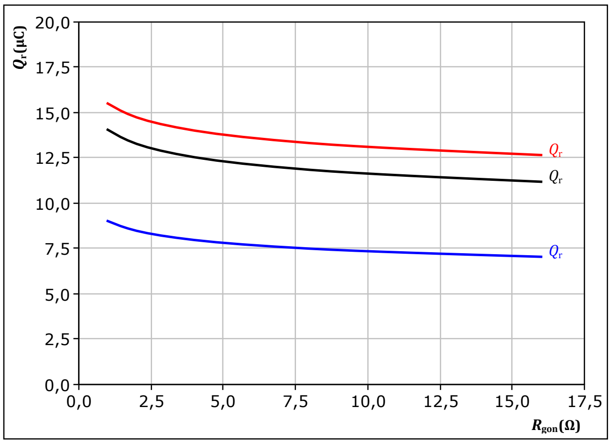
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 4 Ω

T_j:
25 °C
125 °C
150 °C

figure 29. **FWD**

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

Q_r = f(R_{gon})



With an inductive load at

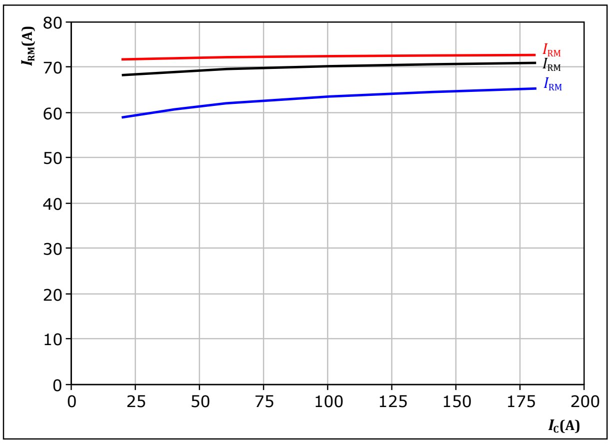
V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 100 A

T_j:
25 °C
125 °C
150 °C

figure 30. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



With an inductive load at

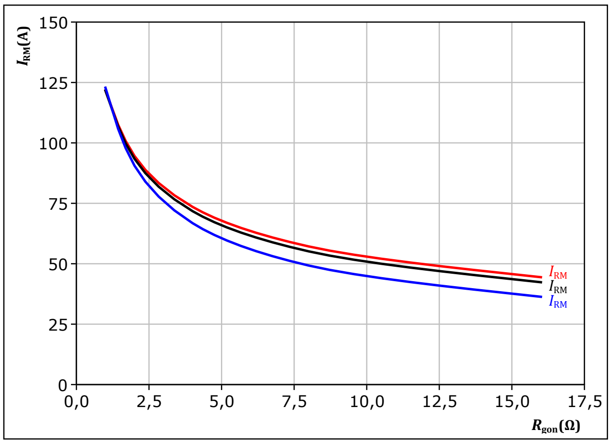
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 4 Ω

T_j:
25 °C
125 °C
150 °C

figure 31. **FWD**

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

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



With an inductive load at

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

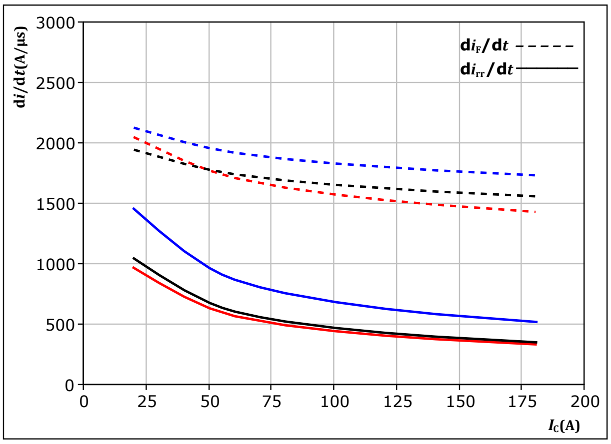
T_j:
25 °C
125 °C
150 °C

Inverter Switching Characteristics

figure 32. **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

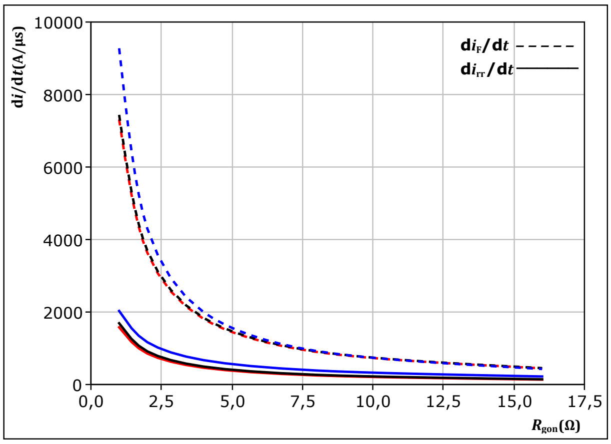
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 4 Ω

T_j:
25 °C
125 °C
150 °C

figure 33. **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

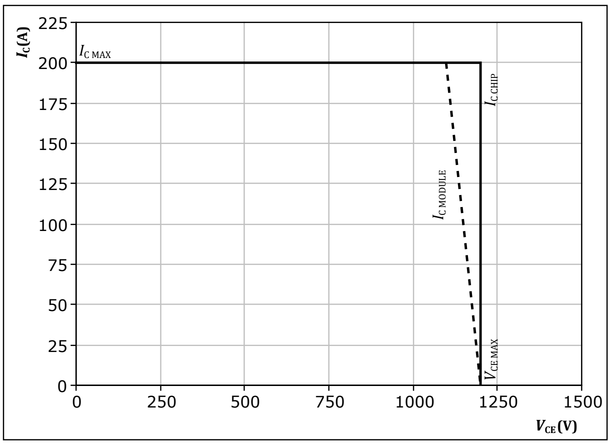
V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 100 A

T_j:
25 °C
125 °C
150 °C

figure 34. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



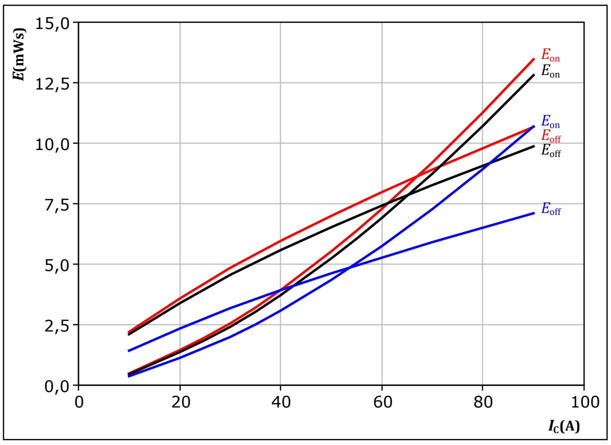
At T_j = 150 °C
R_{gon} = 4 Ω
R_{goff} = 4 Ω

Brake Switching Characteristics

figure 35. **IGBT**

Typical switching energy losses as a function of collector current

E = f(I_C)



With an inductive load at

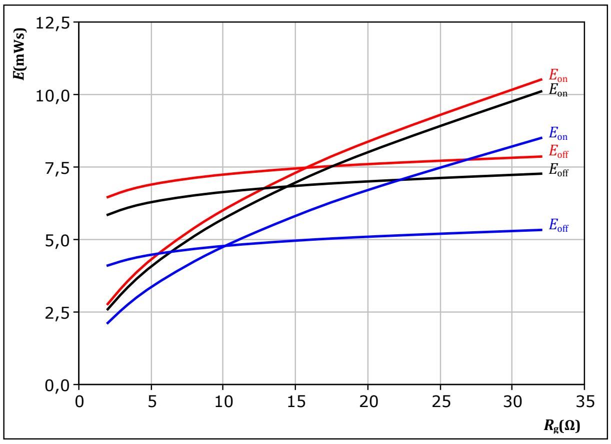
V_{CE} = 700 V
V_{GE} = 0/15 V
R_{gon} = 8 Ω
R_{goff} = 8 Ω

T_j: 25 °C / 125 °C / 150 °C

figure 36. **IGBT**

Typical switching energy losses as a function of IGBT turn on gate resistor

E = f(R_g)



With an inductive load at

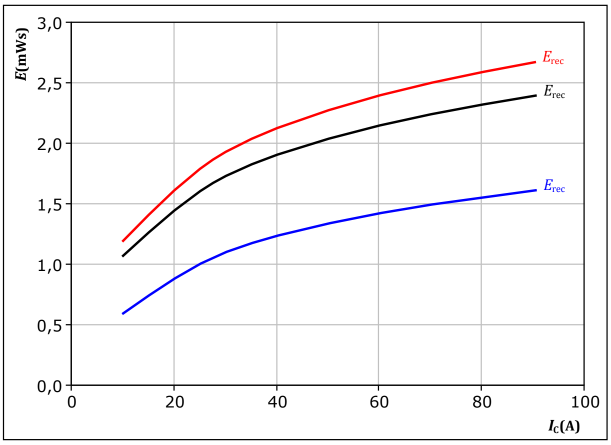
V_{CE} = 700 V
V_{GE} = 0/15 V
I_C = 50 A

T_j: 25 °C / 125 °C / 150 °C

figure 37. **FWD**

Typical reverse recovered energy loss as a function of collector current

E_{rec} = f(I_C)



With an inductive load at

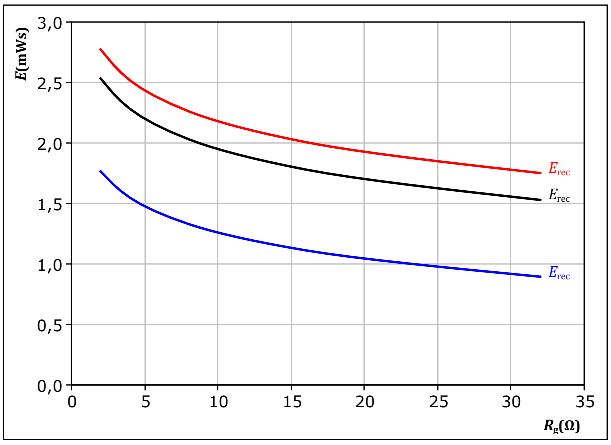
V_{CE} = 700 V
V_{GE} = 0/15 V
R_{gon} = 8 Ω

T_j: 25 °C / 125 °C / 150 °C

figure 38. **FWD**

Typical reverse recovered energy loss as a function of IGBT turn on gate resistor

E_{rec} = f(R_g)



With an inductive load at

V_{CE} = 700 V
V_{GE} = 0/15 V
I_C = 50 A

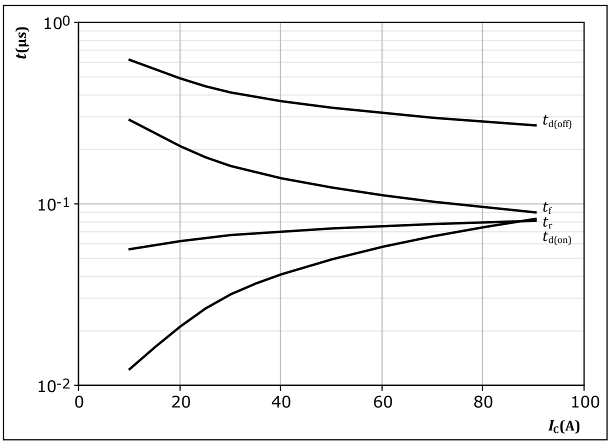
T_j: 25 °C / 125 °C / 150 °C

Brake Switching Characteristics

figure 39. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



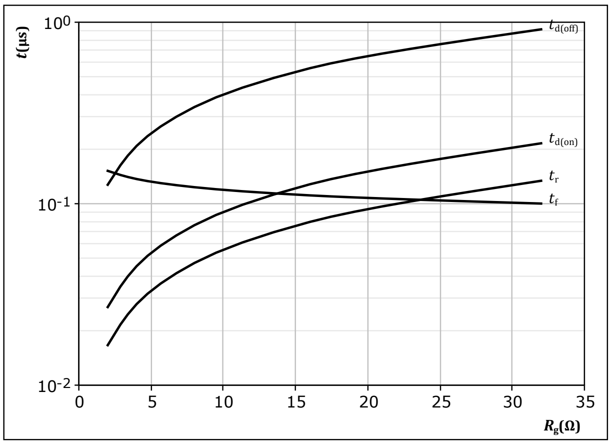
With an inductive load at

T_j = 150 °C
V_{CE} = 700 V
V_{GE} = 0/15 V
R_{gon} = 8 Ω
R_{goff} = 8 Ω

figure 40. **IGBT**

Typical switching times as a function of IGBT turn on gate resistor

t = f(R_g)



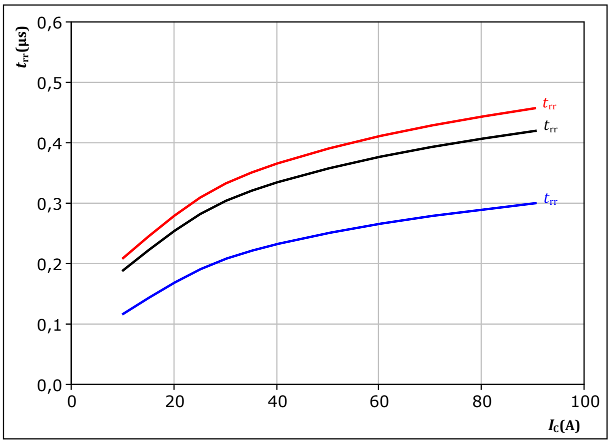
With an inductive load at

T_j = 150 °C
V_{CE} = 700 V
V_{GE} = 0/15 V
I_C = 50 A

figure 41. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

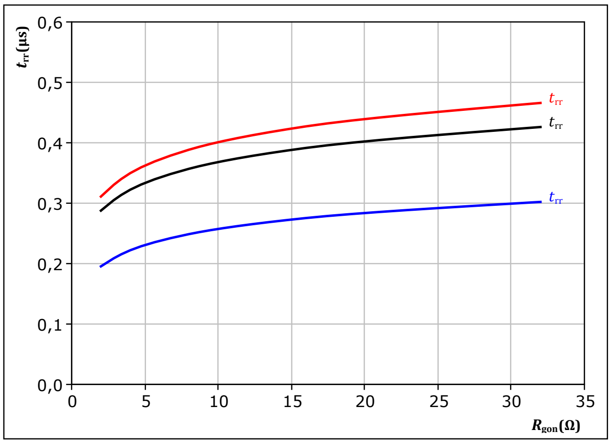
V_{CE} = 700 V
V_{GE} = 0/15 V
R_{gon} = 8 Ω

T_j:
— 25 °C
— 125 °C
— 150 °C

figure 42. **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} = 700 V
V_{GE} = 0/15 V
I_C = 50 A

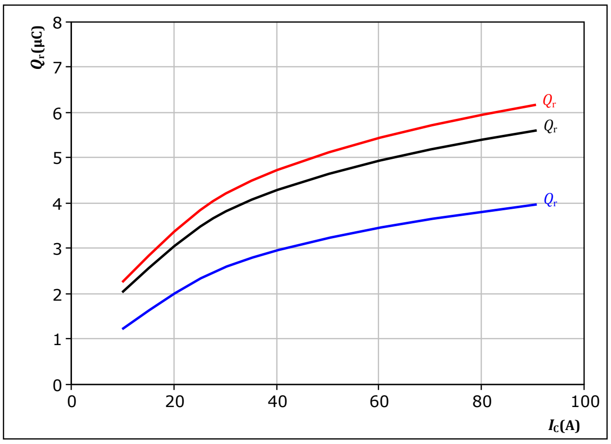
T_j:
— 25 °C
— 125 °C
— 150 °C

Brake Switching Characteristics

figure 43. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



With an inductive load at

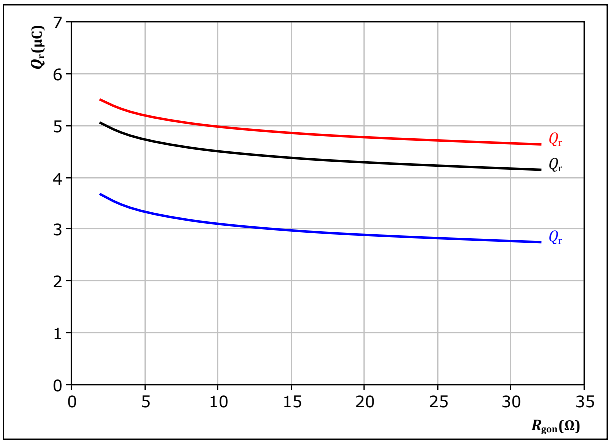
V_{CE} = 700 V
V_{GE} = 0/15 V
R_{gon} = 8 Ω

T_j:
25 °C
125 °C
150 °C

figure 44. **FWD**

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

Q_r = f(R_{gon})



With an inductive load at

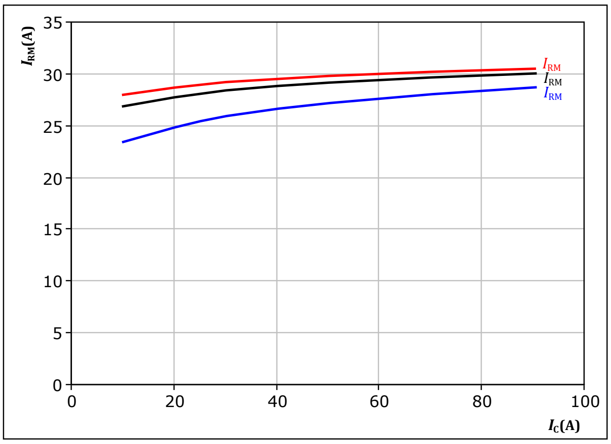
V_{CE} = 700 V
V_{GE} = 0/15 V
I_C = 50 A

T_j:
25 °C
125 °C
150 °C

figure 45. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



With an inductive load at

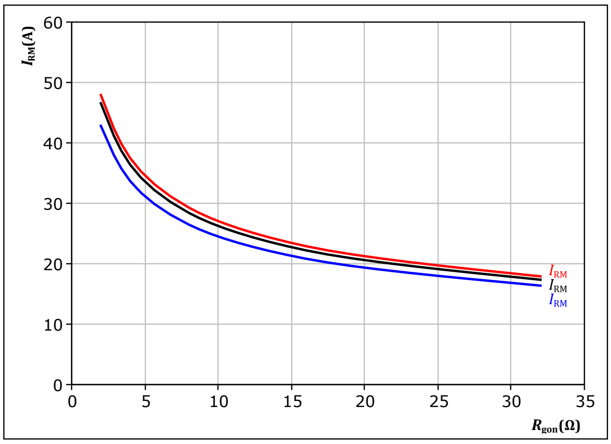
V_{CE} = 700 V
V_{GE} = 0/15 V
R_{gon} = 8 Ω

T_j:
25 °C
125 °C
150 °C

figure 46. **FWD**

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

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



With an inductive load at

V_{CE} = 700 V
V_{GE} = 0/15 V
I_C = 50 A

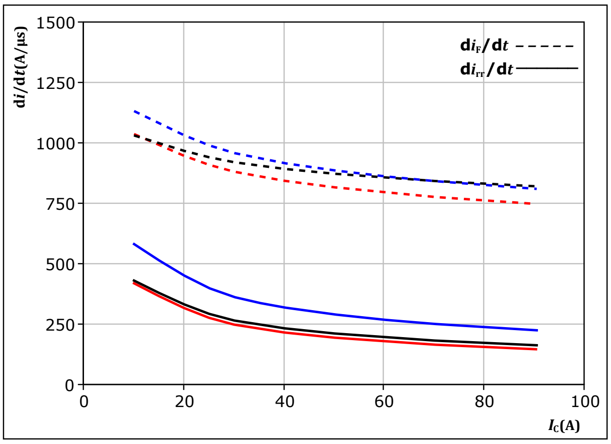
T_j:
25 °C
125 °C
150 °C

Brake Switching Characteristics

figure 47. **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

V_{GE} = 0/15 V

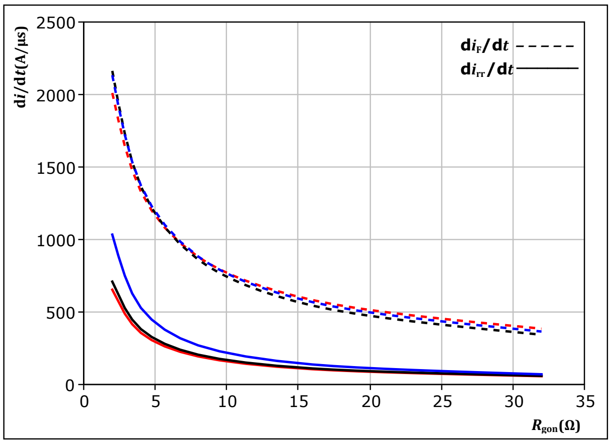
R_{gon} = 8 Ω

T_j: 25 °C, 125 °C, 150 °C

figure 48. **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} = 700 V

V_{GE} = 0/15 V

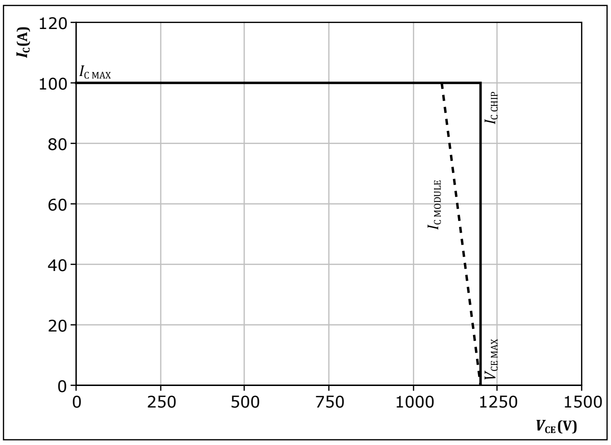
I_C = 50 A

T_j: 25 °C, 125 °C, 150 °C

figure 49. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At T_j = 150 °C

R_{gon} = 8 Ω

R_{goff} = 8 Ω

Switching Definitions

figure 50. **IGBT**

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

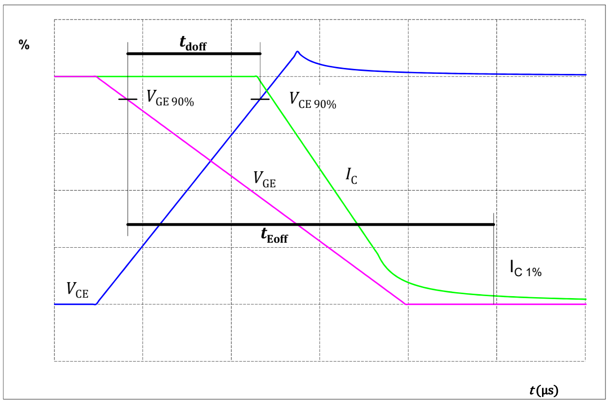


figure 51. **IGBT**

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

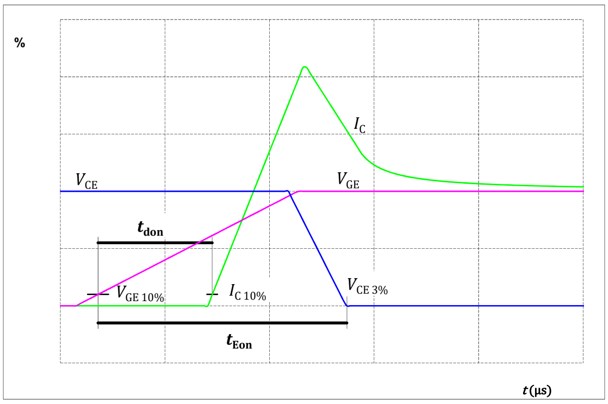


figure 52. **IGBT**

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

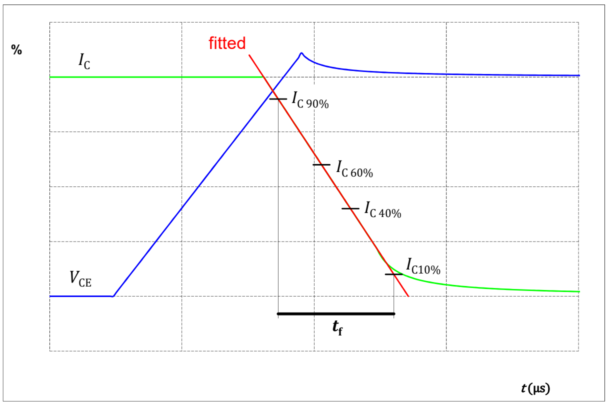
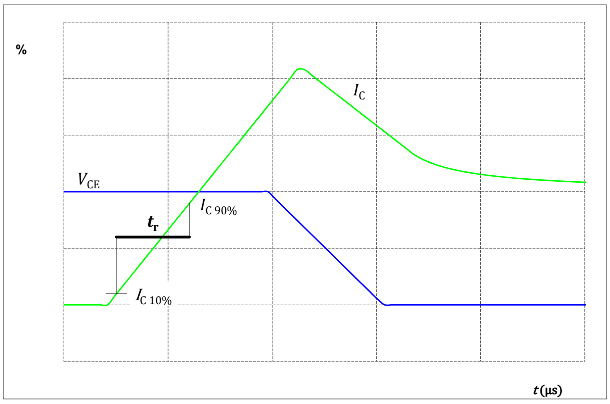


figure 53. **IGBT**

Turn-on Switching Waveforms & definition of t_{r}



Switching Definitions

figure 54. **FWD**

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

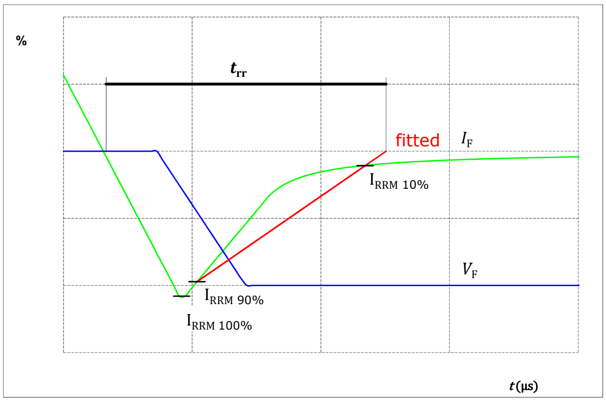
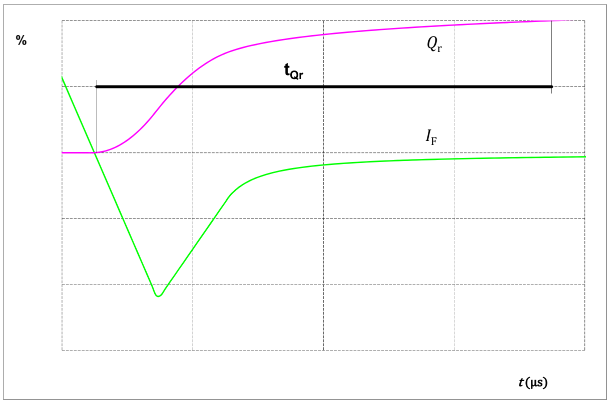


figure 55. **FWD**

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



Ordering Code

Version	Ordering Code
Without thermal paste	B0-EP12PMA100M7-PE89A68T
With thermal paste (5,2 W/mK, PTM6000HV)	B0-EP12PMA100M7-PE89A68T-/7/

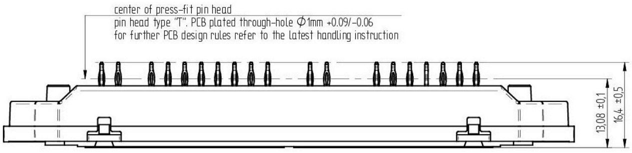
Marking

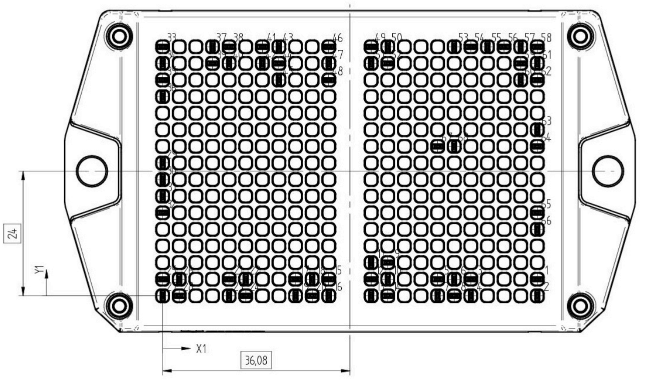
<table>
<tr><td rowspan="4">NN-NNNNNNNNNNNNNN
TTTTTTVV WWYY UL
VIN LLLLL SSSS</td><td rowspan="2">Text</td><td colspan="2">Name</td><td>Date code</td><td>UL & VIN</td><td>Lot</td><td>Serial</td></tr>
<tr><td colspan="2">NN-NNNNNNNNNNNNNN-TTTTTTVV</td><td>WWYY</td><td>UL VIN</td><td>LLLLL</td><td>SSSS</td></tr>
<tr><td rowspan="2">Datamatrix</td><td>Type&Ver</td><td>Lot number</td><td>Serial</td><td>Date code</td><td></td><td></td></tr>
<tr><td>TTTTTTTVV</td><td>LLLLL</td><td>SSSS</td><td>WWYY</td><td></td><td></td></tr>
</table>

Outline

Pin table [mm]

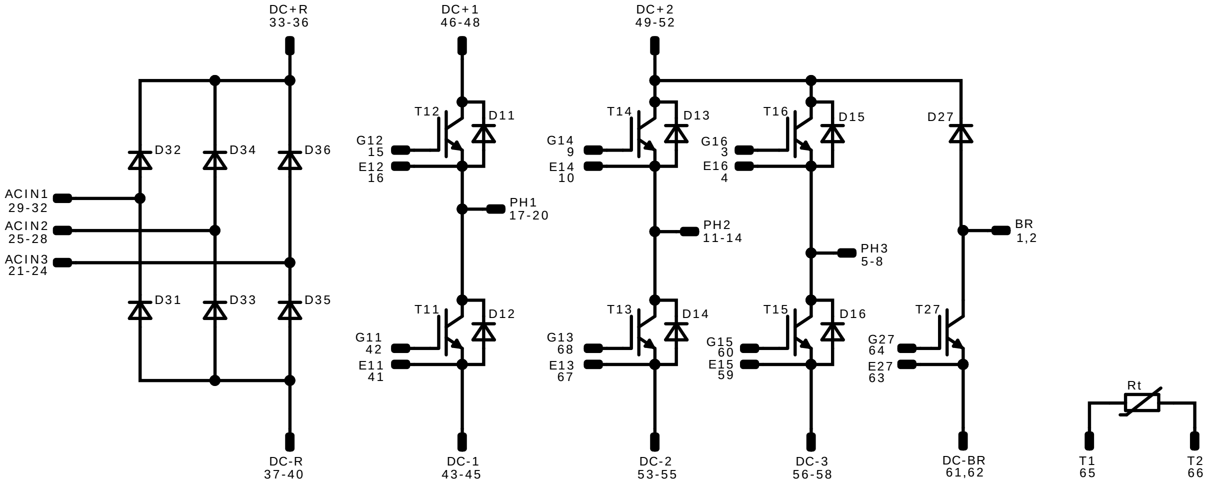
Pin	X	Y	Function
1	72,16	3,2	BR
2	72,16	0	BR
3	59,36	3,2	G16
4	59,36	0	E16
5	52,96	3,2	PH3
6	56,16	3,2	PH3
7	52,96	0	PH3
8	56,16	0	PH3
9	43,36	6,4	G14
10	43,36	3,2	E14
11	40,16	6,4	PH2
12	40,16	3,2	PH2
13	40,16	0	PH2
14	43,36	0	PH2
15	32	3,2	G12
16	32	0	E12
17	25,6	3,2	PH1
18	28,8	3,2	PH1
19	25,6	0	PH1
20	28,8	0	PH1
21	12,8	3,2	ACIN3
22	16	3,2	ACIN3
23	12,8	0	ACIN3
24	16	0	ACIN3
25	0	3,2	ACIN2
26	3,2	3,2	ACIN2
27	0	0	ACIN2
28	3,2	0	ACIN2
29	0	25,6	ACIN1
30	0	22,4	ACIN1
31	0	19,2	ACIN1
32	0	16	ACIN1
33	0	48	DC+R
34	0	44,8	DC+R
35	0	41,6	DC+R
36	0	38,4	DC+R
37	9,6	48	DC-R
38	12,8	48	DC-R
39	9,6	44,8	DC-R
40	12,8	44,8	DC-R
41	19,2	48	E11
42	19,2	44,8	G11
43	22,4	48	DC-1
44	22,4	44,8	DC-1
45	22,4	41,6	DC-1
46	32	48	DC+1
47	32	44,8	DC+1
48	32	41,6	DC+1
49	40,16	48	DC+2
50	43,36	48	DC+2
51	40,16	44,8	DC+2
52	43,36	44,8	DC+2
53	56,16	48	DC-2
54	59,36	48	DC-2
55	62,56	48	DC-2
56	65,76	48	DC-3
57	68,96	48	DC-3
58	72,16	48	DC-3
59	68,96	44,8	E15
60	68,96	41,6	G15
61	72,16	44,8	DC-BR
62	72,16	41,6	DC-BR
63	72,16	32	E27
64	72,16	28,8	G27
65	72,16	16	T1
66	72,16	12,8	T2
67	52,96	28,8	E13
68	56,16	28,8	G13


center of press-fit pin head
pin head type "T". PCB plated through-hole Φ1mm +0.09/-0.06
for further PCB design rules refer to the latest handling instruction



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

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	50 A	Brake Switch	
D27	FWD	1200 V	25 A	Brake Diode	
D31, D32, D33, D34, D35, D36	Rectifier	1600 V	60 A	Rectifier Diode	
Rt	Thermistor			Thermistor	

Packaging instruction

Standard packaging quantity (SPQ) 40	>SPQ	Standard	<SPQ	Sample

Handling instruction

Handling instructions for *flow* E3 packages see vincotech.com website.

Package data

Package data for *flow* E3 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-EP12PMA100M7-PE89A68T-D1-14	1 Sep. 2022		

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As used herein:

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