Vincotech

10-PY07PMA040I7-P585B68Y
datasheet

***flow*PIM 1 + PFC** **650 V / 40 A**

Topology features

- Converter+Brake+Inverter
- Open Emitter configuration
- Temperature sensor

Component features

- Easy paralleling
- Low collector emitter saturation voltage
- Low turn-off losses
- Positive temperature coefficient

Housing features

- Base isolation: Al_2O_3
- Convex shaped substrate for superior thermal contact
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

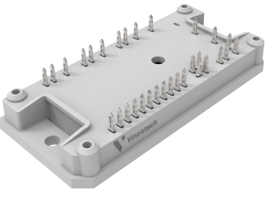
Target applications

- Embedded Drives
- Heat Pumps
- HVAC
- Industrial Drives

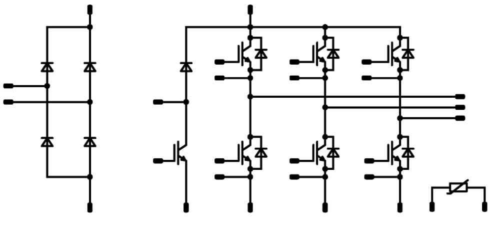
Types

- 10-PY07PMA040I7-P585B68Y

flow 1 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}			650	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	45	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		120	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	65	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V, V_{CC} = 400 V	T_j = 150 °C	3	μs
Maximum junction temperature	T_{jmax}			175	°C
Inverter Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	38	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		120	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	54	W
Maximum junction temperature	T_{jmax}			175	°C
Brake Switch					
Collector-emitter voltage	V_{CES}			650	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	45	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		120	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	65	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V, V_{CC} = 400 V	T_j = 150 °C	3	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}			650	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	22	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		60	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	34	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	52	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	400	A
Surge current capability	I^2t			800	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	59	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
Creepage distance				>12,7	mm
Clearance				8,34	mm
Comparative Tracking Index	CTI			≥ 200	

*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	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0004	25	4,35	5	5,65	V
Collector-emitter saturation voltage	V_{CEsat}		15		40	25 125 150		1,29 1,35 1,37	1,65(1)	V
Collector-emitter cut-off current	I_{CES}		0	650		25			20	µA
Gate-emitter leakage current	I_{GES}		20	0		25			100	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	25		25		2475		pF
Output capacitance	C_{oes}							77		pF
Reverse transfer capacitance	C_{res}							25		pF
Gate charge	Q_g	V_{CC} = 520 V	15		40	25		235		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						1,46		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	-5/15	350	40	25 125 150		23,25 26,16 26,34		ns
Rise time	t_r					25 125 150		8,38 9,51 9,63		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		117,32 143,52 149,94		ns
Fall time	t_f					25 125 150		24,19 39,19 45,49		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=1,05 µC Q_{rFWD}=2,04 µC Q_{rFWD}=2,37 µC				25 125 150		0,17 0,263 0,298		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,622 0,875 0,963		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				40	25 125 150		1,62 1,52 1,49	2(1)	V
Reverse leakage current	I_R	V_r = 650 V				25			20	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						1,74		K/W
Dynamic										
Peak recovery current	I_{RM}	di/dt=4691 A/µs di/dt=4505 A/µs di/dt=4493 A/µs	-5/15	350	40	25 125 150		49,55 61,87 66,22		A
Reverse recovery time	t_{rr}					25 125 150		50,94 82,42 92,37		ns
Recovered charge	Q_r					25 125 150		1,05 2,04 2,37		µC
Reverse recovered energy	E_{rec}					25 125 150		0,306 0,588 0,682		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		2555,19 2000,21 2092,57		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	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0004	25	4,35	5	5,65	V
Collector-emitter saturation voltage	V_{CEsat}		15		40	25 125 150		1,29 1,35 1,37	1,65(1)	V
Collector-emitter cut-off current	I_{CES}		0	650		25			20	µA
Gate-emitter leakage current	I_{GES}		20	0		25			100	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	25		25		2475		pF
Output capacitance	C_{oes}							77		pF
Reverse transfer capacitance	C_{res}							25		pF
Gate charge	Q_g	V_{CC} = 520 V	15		40	25		235		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						1,46		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	0/15	400	40	25 125 150		19,72 20,62 20,73		ns
Rise time	t_r					25 125 150		15,03 15,91 16,08		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		134,47 166 174,29		ns
Fall time	t_f					25 125 150		19,97 38,16 43,15		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,713 µC Q_{rFWD}=1,48 µC Q_{rFWD}=1,73 µC				25 125 150		0,654 0,863 0,91		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,658 1 1,11		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				20	25 125 150		1,71 1,6 1,55	2(1)	V
Reverse leakage current	I_R	V_r = 650 V				25			20	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						2,81		K/W
Dynamic										
Peak recovery current	I_{RM}	d*i*/d*t*=1357 A/µs d*i*/d*t*=1469 A/µs d*i*/d*t*=1545 A/µs	0/15	400	40	25 125 150		14,08 20,35 21,7		A
Reverse recovery time	t_{rr}					25 125 150		91,01 133,87 147,9		ns
Recovered charge	Q_r					25 125 150		0,713 1,48 1,73		µC
Reverse recovered energy	E_{rec}					25 125 150		0,195 0,432 0,509		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		429,19 228,53 210,47		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				35	25 125 150		1,09 1,03 1,02	1,5[(1)]	V
Reverse leakage current	I_R	V_r = 1600 V				25 150			100 2000	µA
Thermal										
Thermal resistance junction to sink[(2)]	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						1,19		K/W
Thermistor										
Static										
Rated resistance	R					25		22		kΩ
Deviation of R100	$\Delta_{R/R}$	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

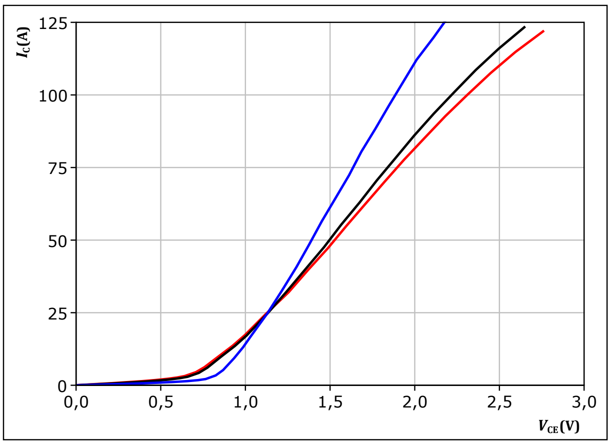
(2) Only valid with pre-applied Vincotech thermal interface material.

Inverter Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

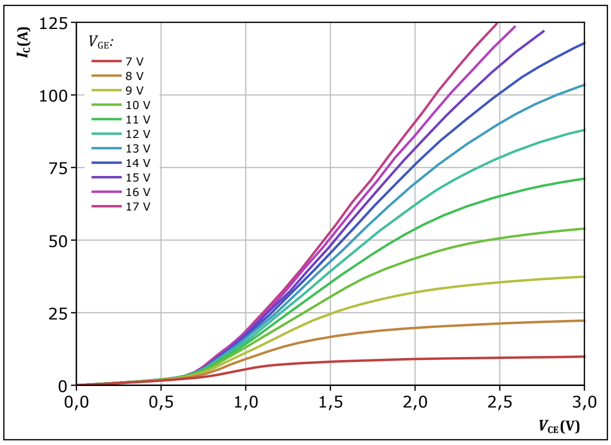


t_p =	250	µs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 2. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



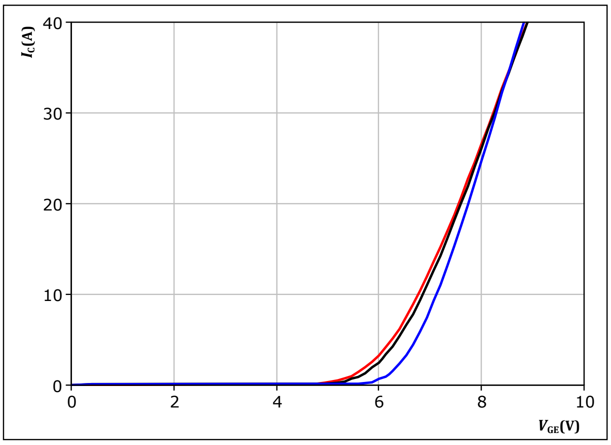
t_p =	250	µs
T_j =	150	°C

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

figure 3. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})

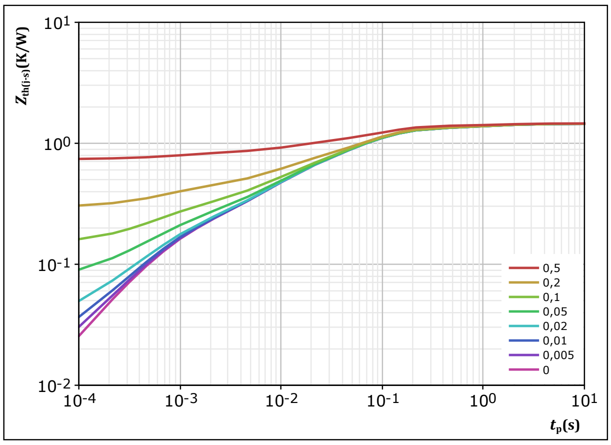


t_p =	250	µs		25 °C
V_{CE} =	9	V	T_j:	125 °C
				150 °C

figure 4. **IGBT**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,46 K/W

IGBT thermal model values

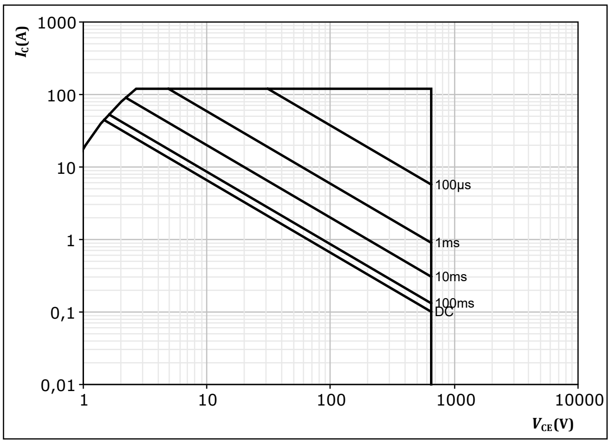
R (K/W)	τ (s)
2,96E-02	4,18E+01
1,52E-01	1,05E+00
8,10E-01	7,07E-02
3,29E-01	9,38E-03
1,52E-01	6,80E-04

Inverter Switch Characteristics

figure 5. **IGBT**

Safe operating area

I_C = f(V_{CE})

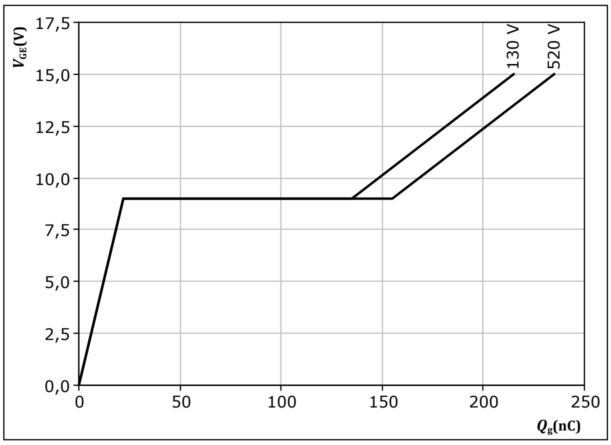


D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

figure 6. **IGBT**

Gate voltage vs gate charge

V_{GE} = f(Q_g)



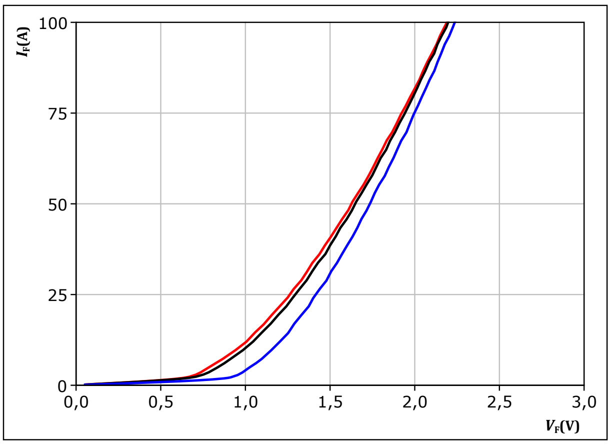
I_C =	40	A
T_j =	25	°C

Inverter Diode Characteristics

figure 7. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



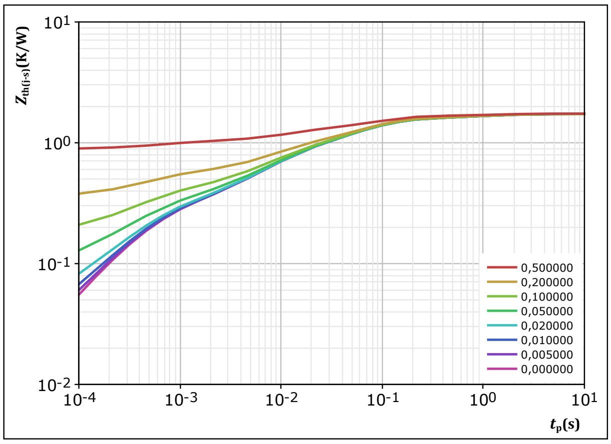
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 8. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 1,745 K/W

FWD thermal model values

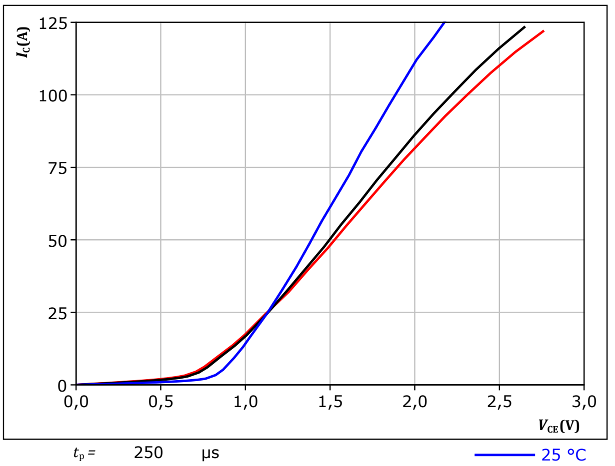
R (K/W)	τ (s)
4,17E-02	1,05E+02
1,71E-01	9,20E-01
8,24E-01	6,43E-02
4,91E-01	8,28E-03
2,37E-01	4,41E-04

Brake Switch Characteristics

figure 9.	IGBT

Typical output characteristics

$I_C = f(V_{CE})$

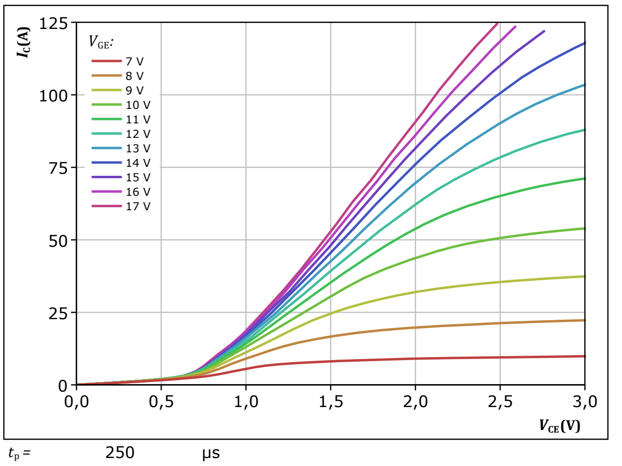


t_p = 250 µs
V_{GE} = 15 V
T_j: 25 °C, 125 °C, 150 °C

figure 10.	IGBT

Typical output characteristics

$I_C = f(V_{CE})$

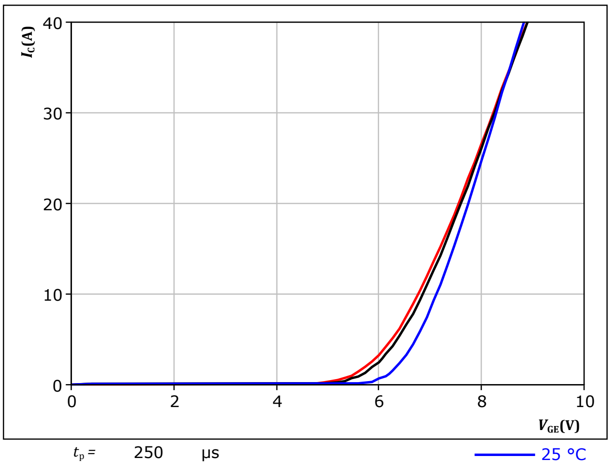


t_p = 250 µs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 11.	IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$

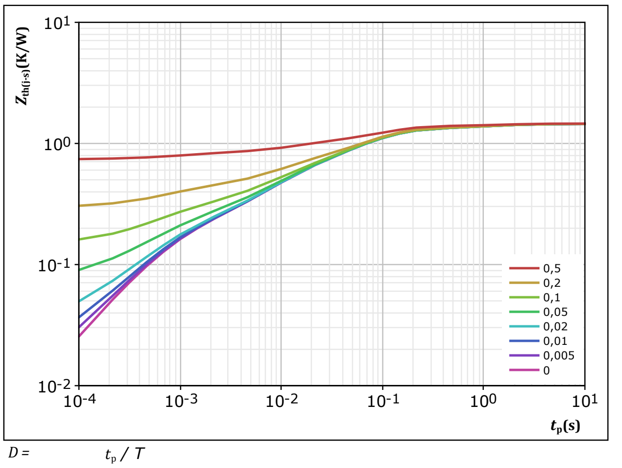


t_p = 250 µs
V_{CE} = 9 V
T_j: 25 °C, 125 °C, 150 °C

figure 12.	IGBT

Transient thermal impedance as a function of pulse width

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



D = t_p / T
$R_{th(j-s)}$ = 1,46 K/W

IGBT thermal model values

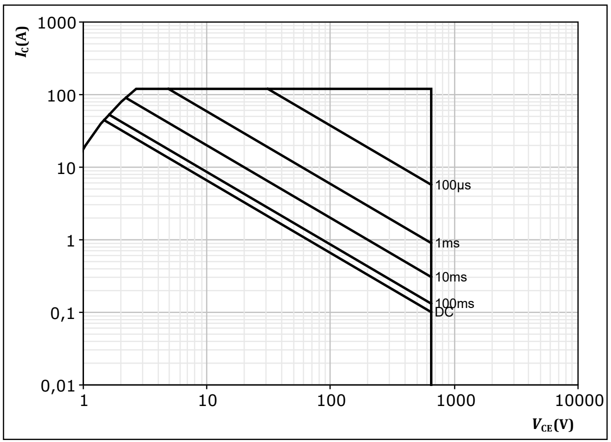
R (K/W)	τ (s)
2,96E-02	4,18E+01
1,52E-01	1,05E+00
8,10E-01	7,07E-02
3,29E-01	9,38E-03
1,52E-01	6,80E-04

Brake Switch Characteristics

figure 13.	IGBT

Safe operating area

I_C = f(V_{CE})

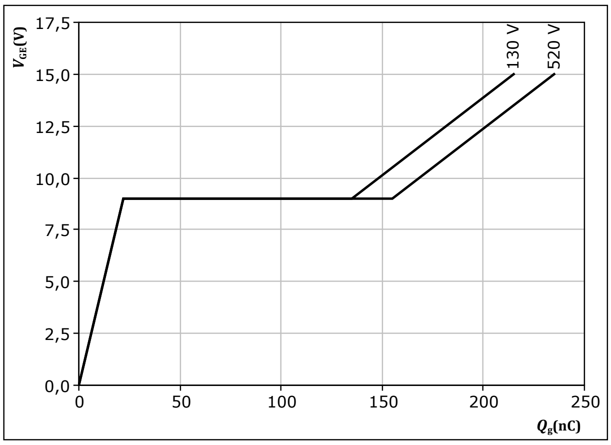


D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

figure 14.	IGBT

Gate voltage vs gate charge

V_{GE} = f(Q_g)



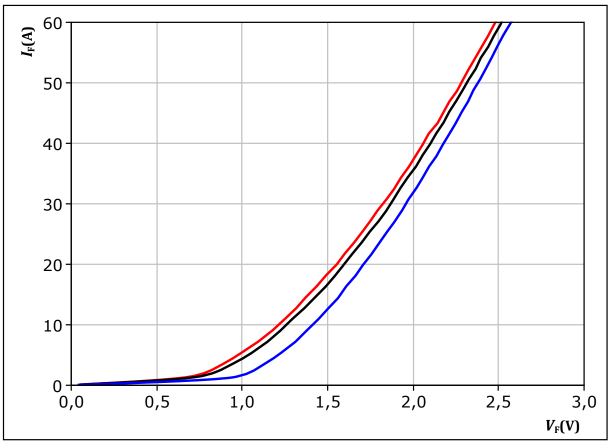
I_C =	40	A
T_j =	25	°C

Brake Diode Characteristics

figure 15. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



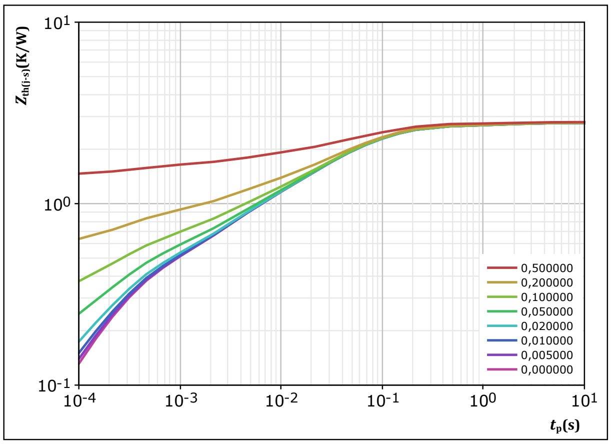
t_p = 250 μs

T_j: 25 °C, 125 °C, 150 °C

figure 16. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 2,815 K/W

FWD thermal model values

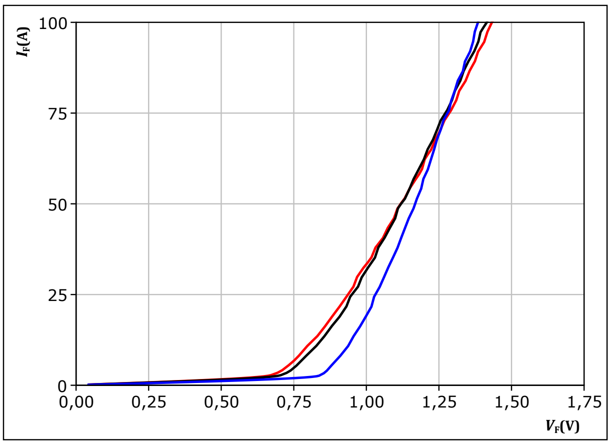
R (K/W)	τ (s)
7,42E-02	8,84E+01
1,46E-01	1,38E+00
1,05E+00	9,07E-02
8,03E-01	2,22E-02
4,24E-01	3,02E-03
3,53E-01	2,60E-04

Rectifier Diode Characteristics

figure 17. **Rectifier**

Typical forward characteristics

I_F = f(V_F)



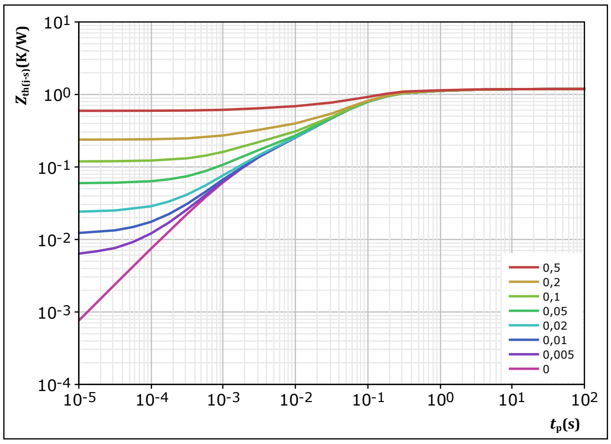
t_p = 250 µs

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

$R_{th(j-s)}$ = 1,19 K/W

Rectifier thermal model values

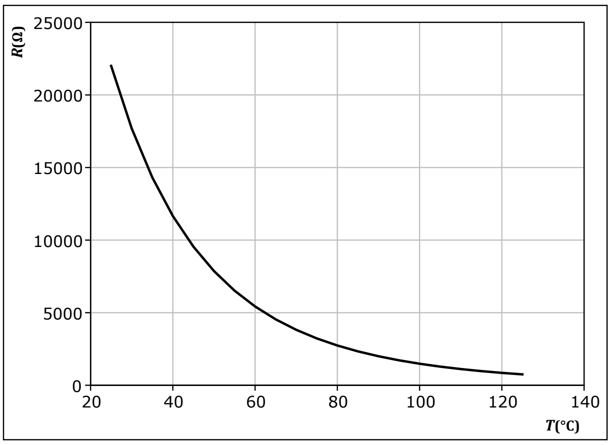
R (K/W)	τ (s)
3,49E-02	7,24E+00
1,42E-01	7,96E-01
7,75E-01	8,48E-02
1,43E-01	1,43E-02
9,52E-02	1,67E-03

Thermistor Characteristics

figure 19. **Thermistor**

Typical NTC characteristic as function of temperature

R_T = f(T)

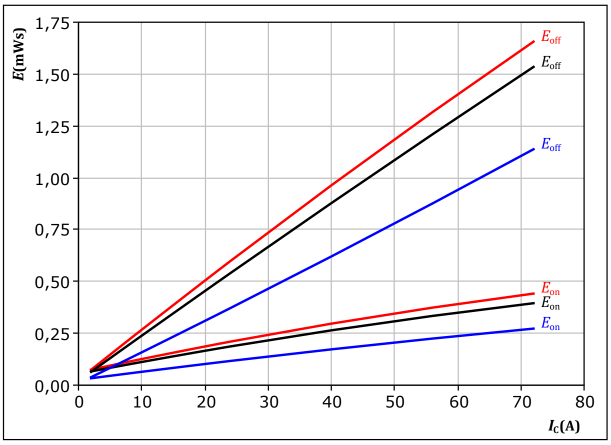


Inverter Switching Characteristics

figure 20. **IGBT**

Typical switching energy losses as a function of collector current

E = f(I_C)



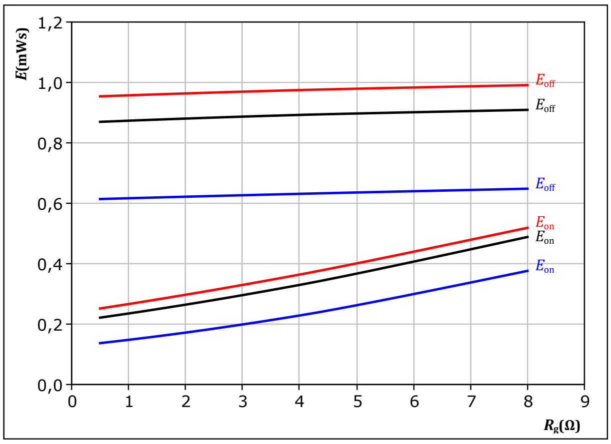
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	
V_{GE} =	-5/15	V		125 °C	
R_{gon} =	2	Ω		150 °C	
R_{goff} =	2	Ω			

figure 21. **IGBT**

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

E = f(R_g)



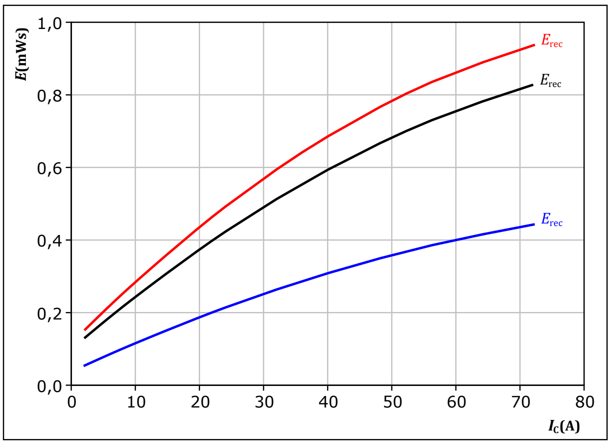
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
I_C =	40	A		150 °C

figure 22. **FWD**

Typical reverse recovered energy loss as a function of collector current

E_{rec} = f(I_C)



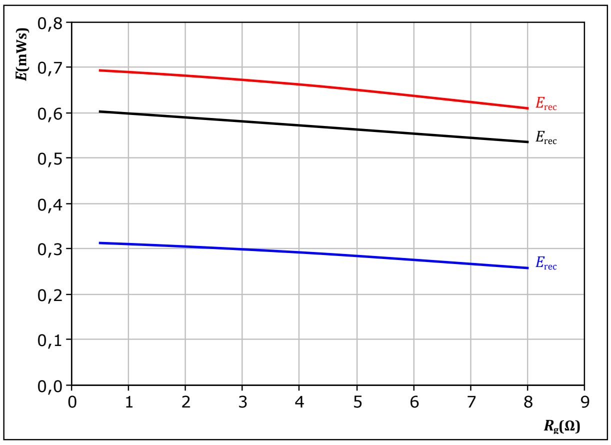
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
R_{gon} =	2	Ω		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

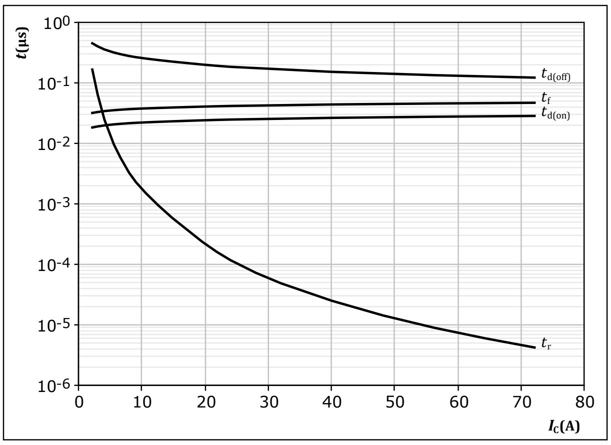
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
I_C =	40	A		150 °C

Inverter Switching Characteristics

figure 24. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



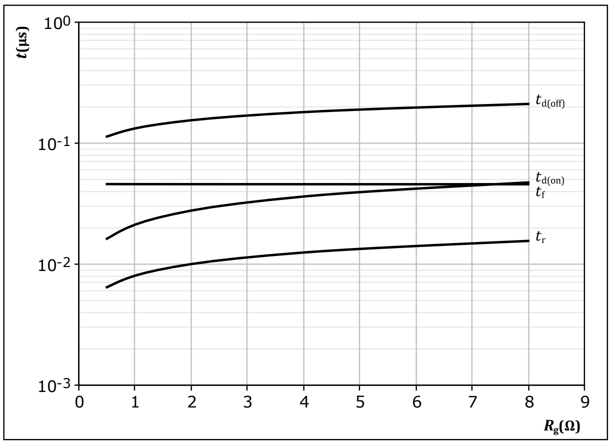
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	-5/15	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

figure 25. **IGBT**

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

t = f(R_g)



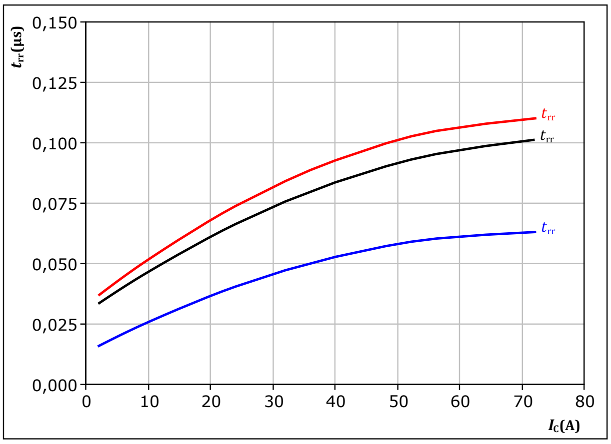
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	-5/15	V
I_C =	40	A

figure 26. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



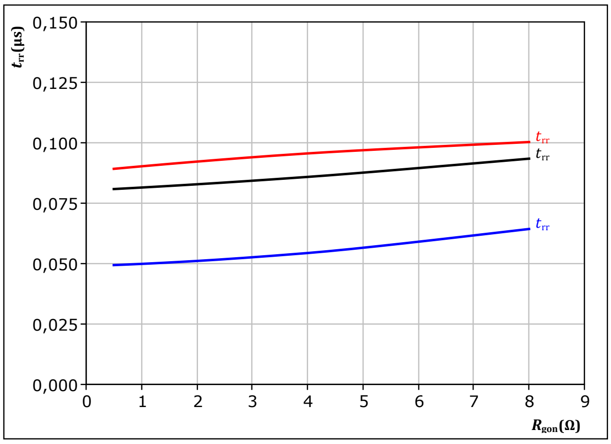
With an inductive load at

V_{CE} =	350	V
V_{GE} =	-5/15	V
R_{gon} =	2	Ω

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

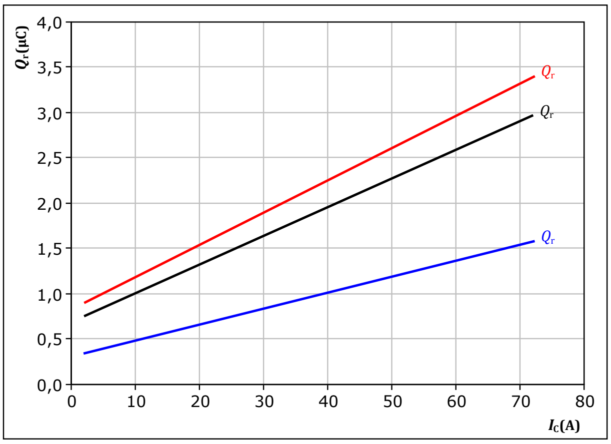
V_{CE} =	350	V
V_{GE} =	-5/15	V
I_C =	40	A

Inverter Switching Characteristics

figure 28. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



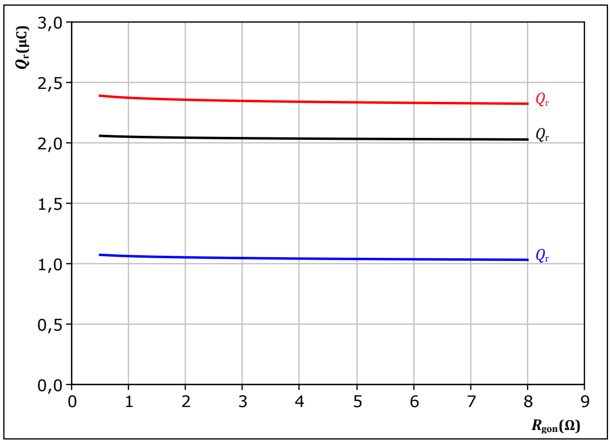
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 29. **FWD**

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

Q_r = f(R_{gon})



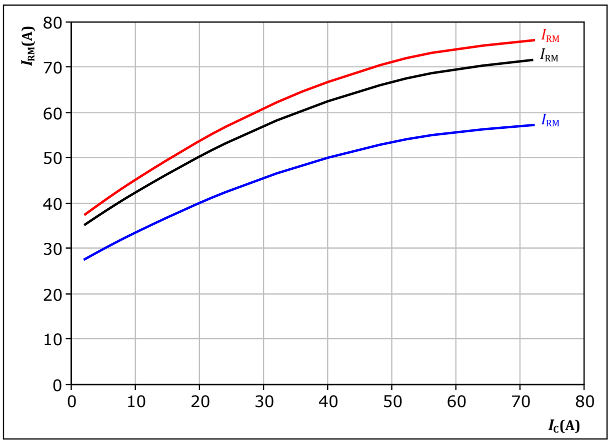
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
I_C =	40	A		150 °C

figure 30. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



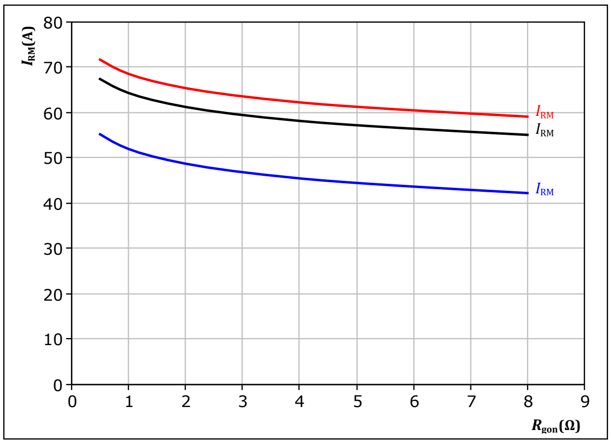
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
R_{gon} =	2	Ω		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

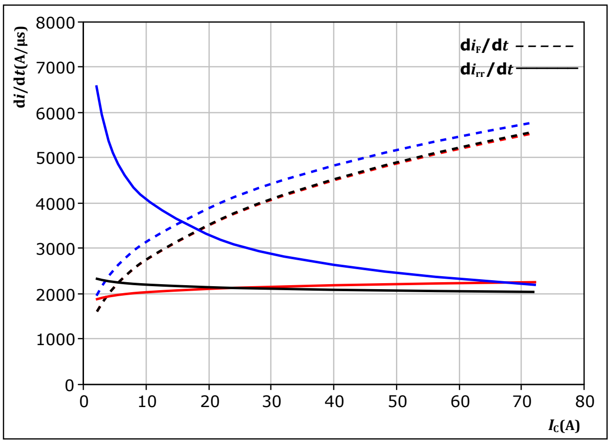
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
I_C =	40	A		150 °C

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)



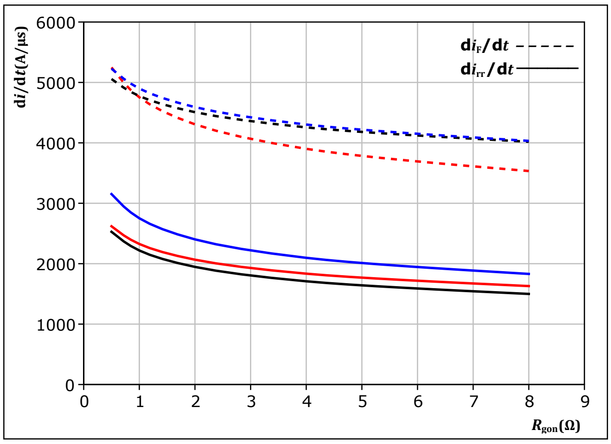
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
R_{gon} =	2	Ω		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})



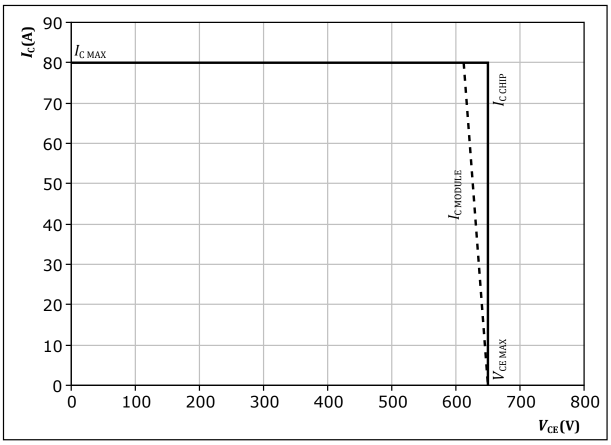
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
I_C =	40	A		150 °C

figure 34. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



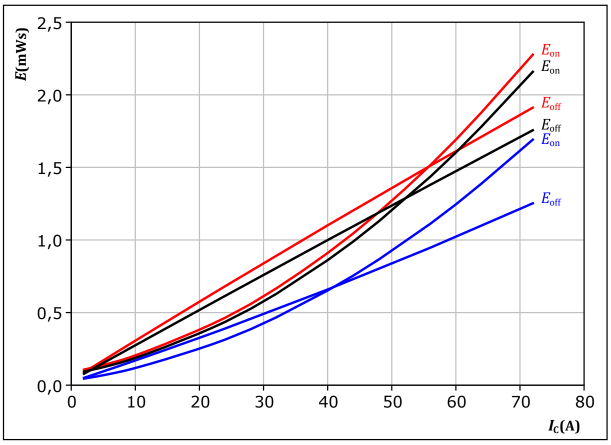
At	T_j =	150	°C
	R_{gon} =	2	Ω
	R_{goff} =	2	Ω

Brake Switching Characteristics

figure 35. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



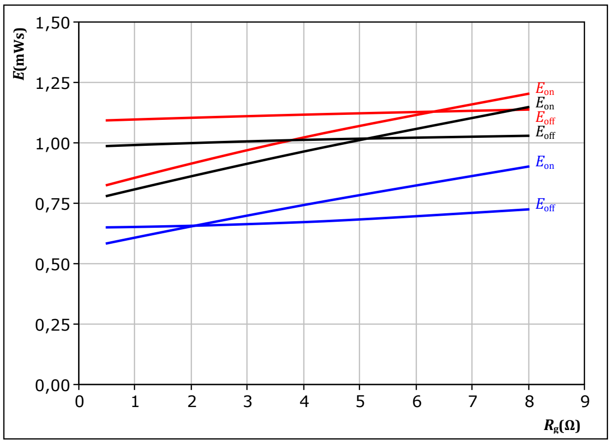
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C
V_{GE} =	0/15	V		125 °C
R_{gon} =	2	Ω		150 °C
R_{goff} =	2	Ω		

figure 36. **IGBT**

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

$E = f(R_g)$



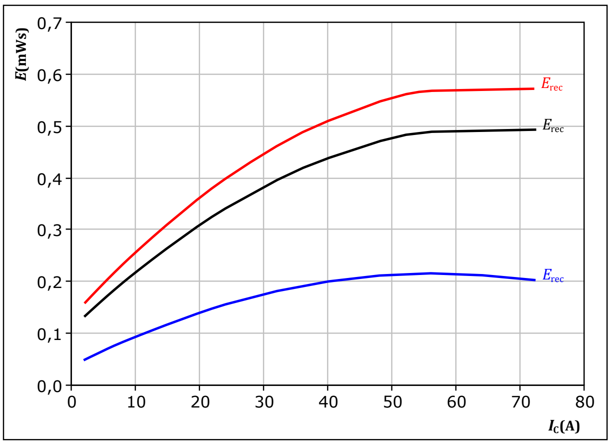
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C
V_{GE} =	0/15	V		125 °C
I_C =	40	A		150 °C

figure 37. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



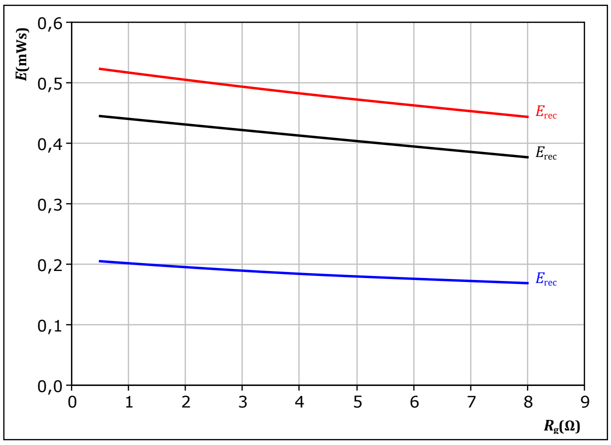
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C
V_{GE} =	0/15	V		125 °C
R_{gon} =	2	Ω		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

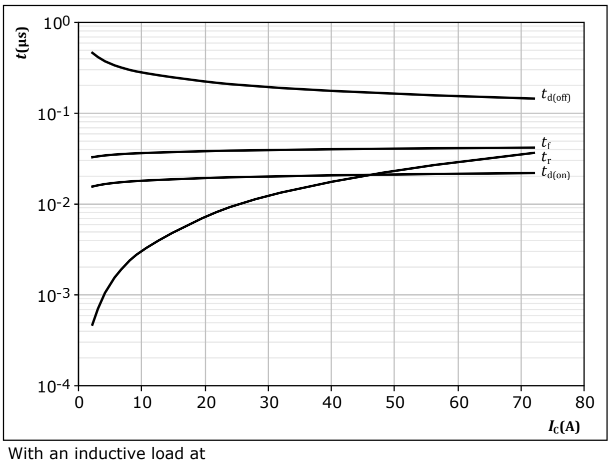
V_{CE} =	400	V	T_j:	25 °C
V_{GE} =	0/15	V		125 °C
I_C =	40	A		150 °C

Brake Switching Characteristics

figure 39. IGBT

Typical switching times as a function of collector current

t = f(I_C)



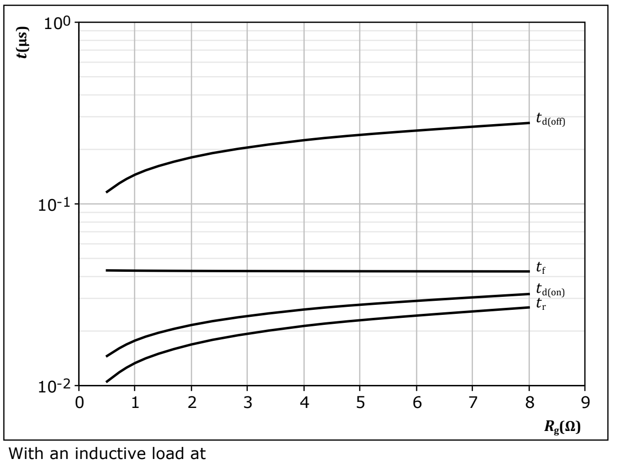
With an inductive load at

T_j =	150	°C
V_{CE} =	400	V
V_{GE} =	0/15	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

figure 40. IGBT

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

t = f(R_g)



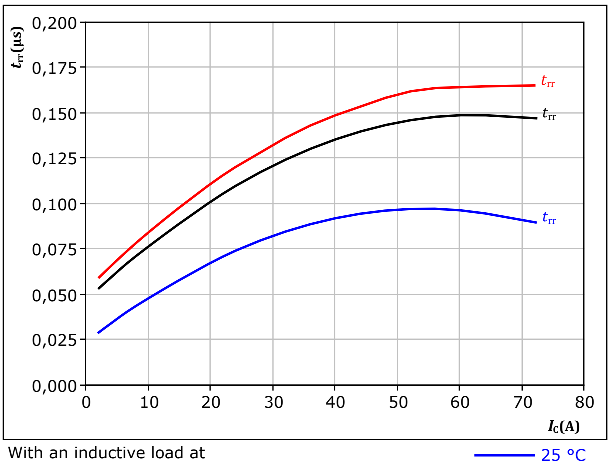
With an inductive load at

T_j =	150	°C
V_{CE} =	400	V
V_{GE} =	0/15	V
I_C =	40	A

figure 41. FWD

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

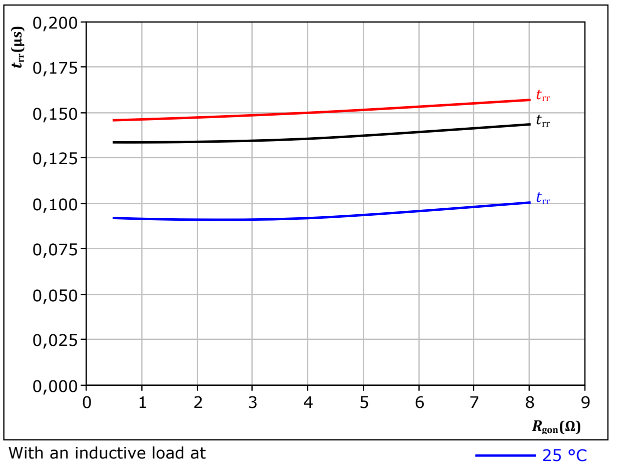
V_{CE} =	400	V
V_{GE} =	0/15	V
R_{gon} =	2	Ω

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} =	400	V
V_{GE} =	0/15	V
I_C =	40	A

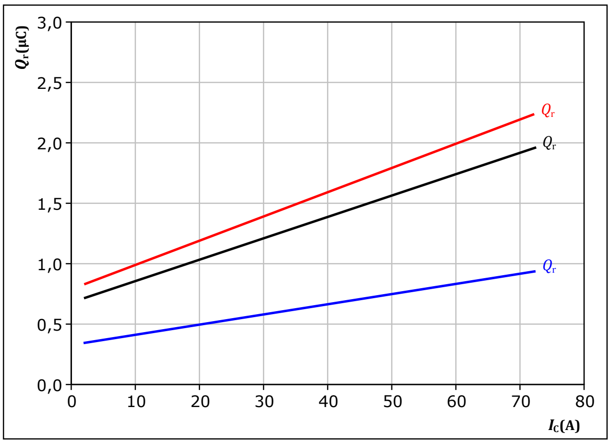
T_j: 25 °C, 125 °C, 150 °C

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

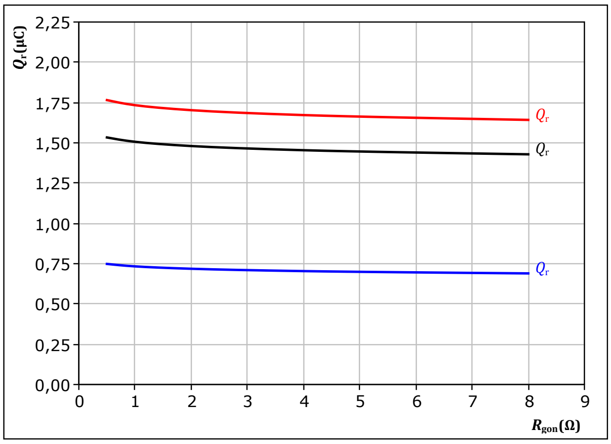
V_{CE} = 400 V
V_{GE} = 0/15 V
R_{gon} = 2 Ω

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

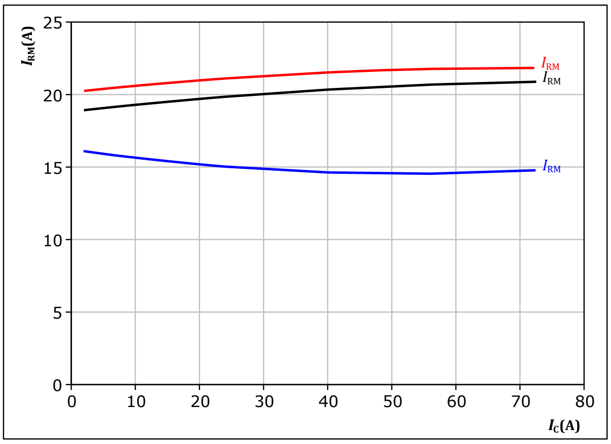
V_{CE} = 400 V
V_{GE} = 0/15 V
I_C = 40 A

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

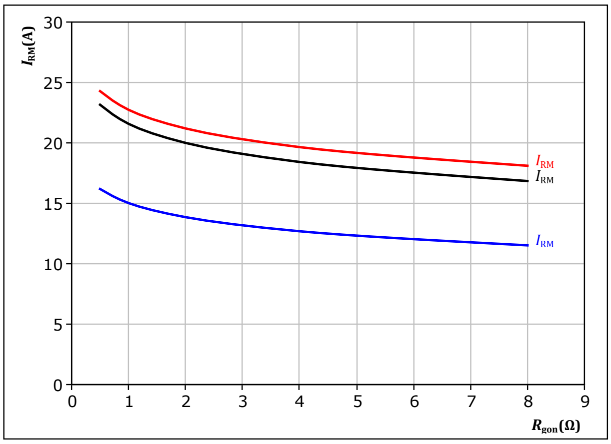
V_{CE} = 400 V
V_{GE} = 0/15 V
R_{gon} = 2 Ω

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} = 400 V
V_{GE} = 0/15 V
I_C = 40 A

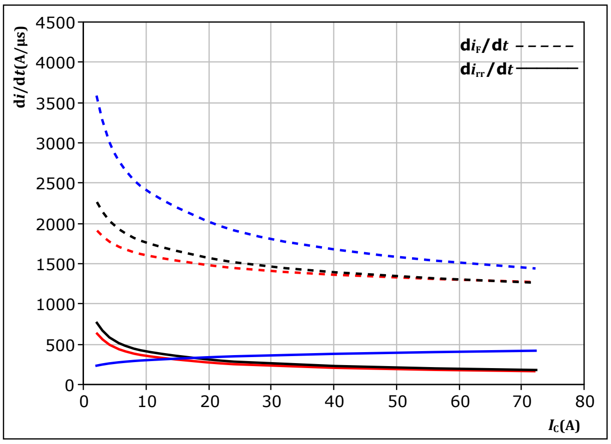
T_j: 25 °C, 125 °C, 150 °C

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

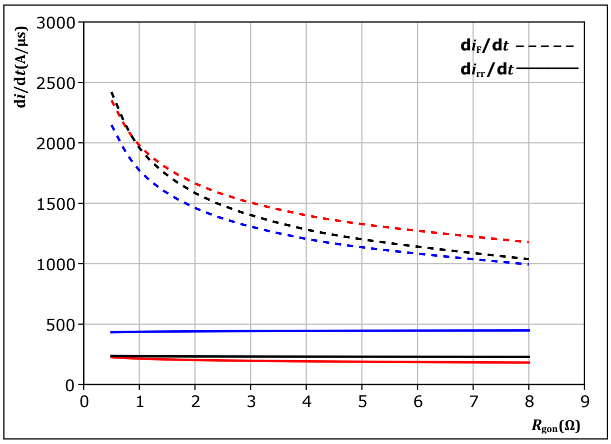
V_{CE} =	400	V
V_{GE} =	0/15	V
R_{gon} =	2	Ω

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

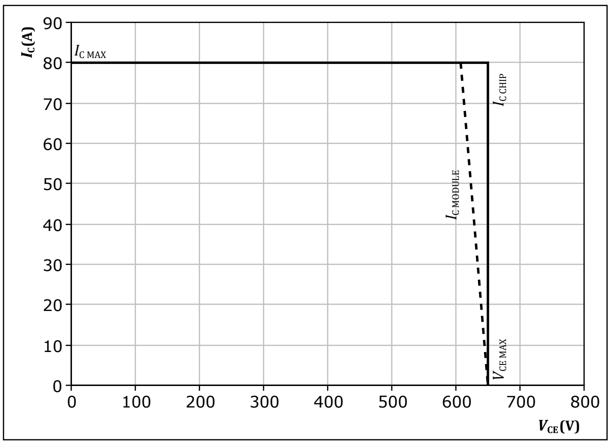
V_{CE} =	400	V
V_{GE} =	0/15	V
I_C =	40	A

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} =	2	Ω
	R_{goff} =	2	Ω

Switching Definitions

figure 50. **IGBT**

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

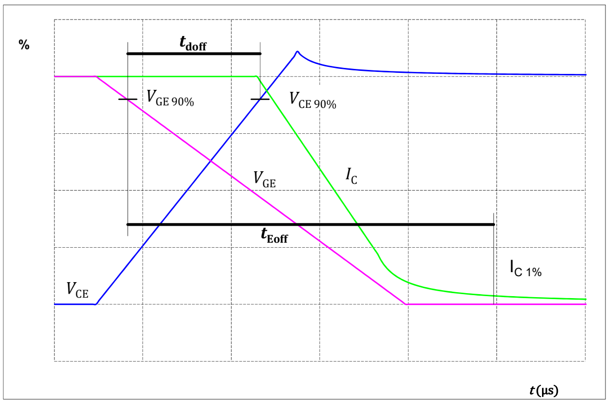


figure 51. **IGBT**

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

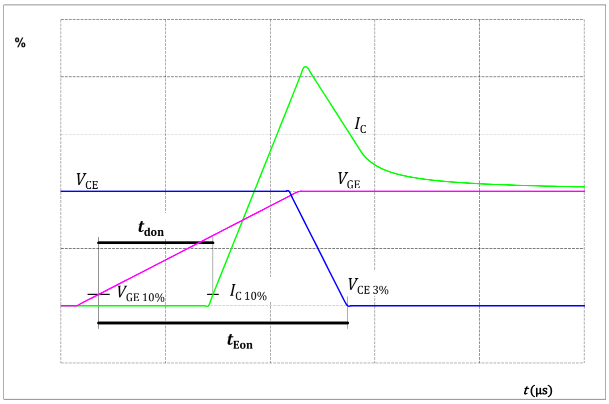


figure 52. **IGBT**

Turn-off Switching Waveforms & definition of t_f

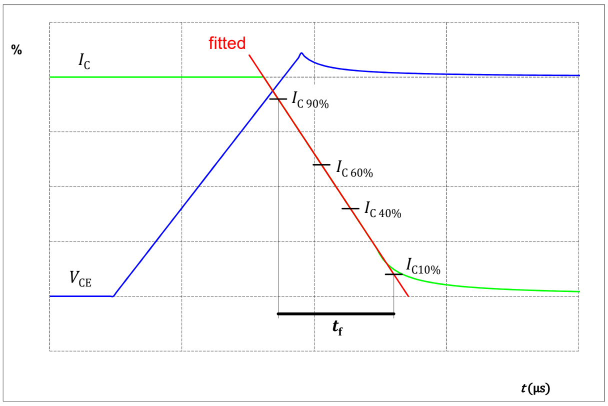
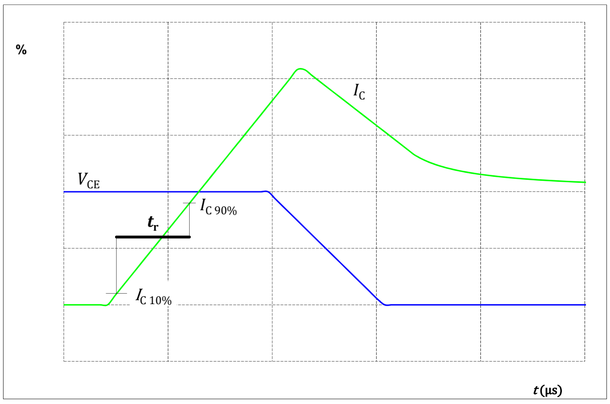


figure 53. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Switching Definitions

figure 54. **FWD**

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

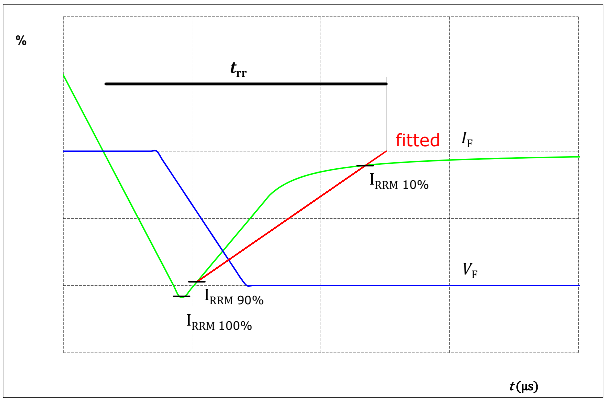
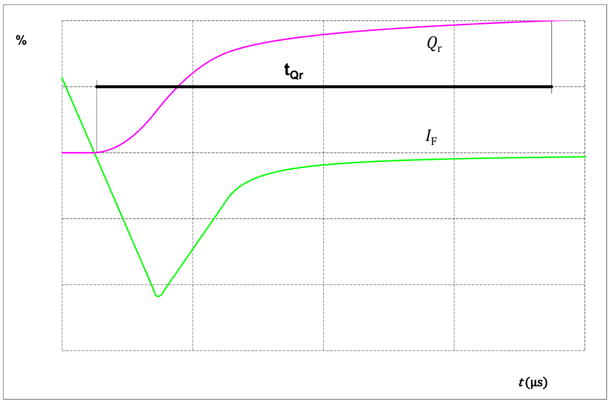


figure 55. **FWD**

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



Ordering Code

Version	Ordering Code
Without thermal paste	10-PY07PMA040I7-P585B68Y
With thermal paste (5,2 W/mK, PTM6000HV)	10-PY07PMA040I7-P585B68Y-/7/

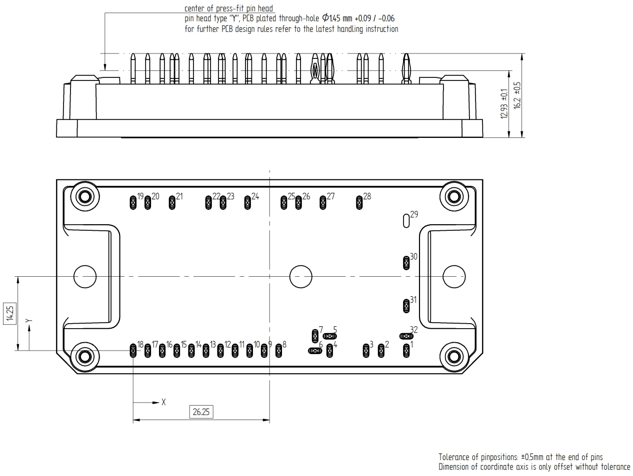
Marking

<table>
<tr><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-TTTTTTTVV</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>

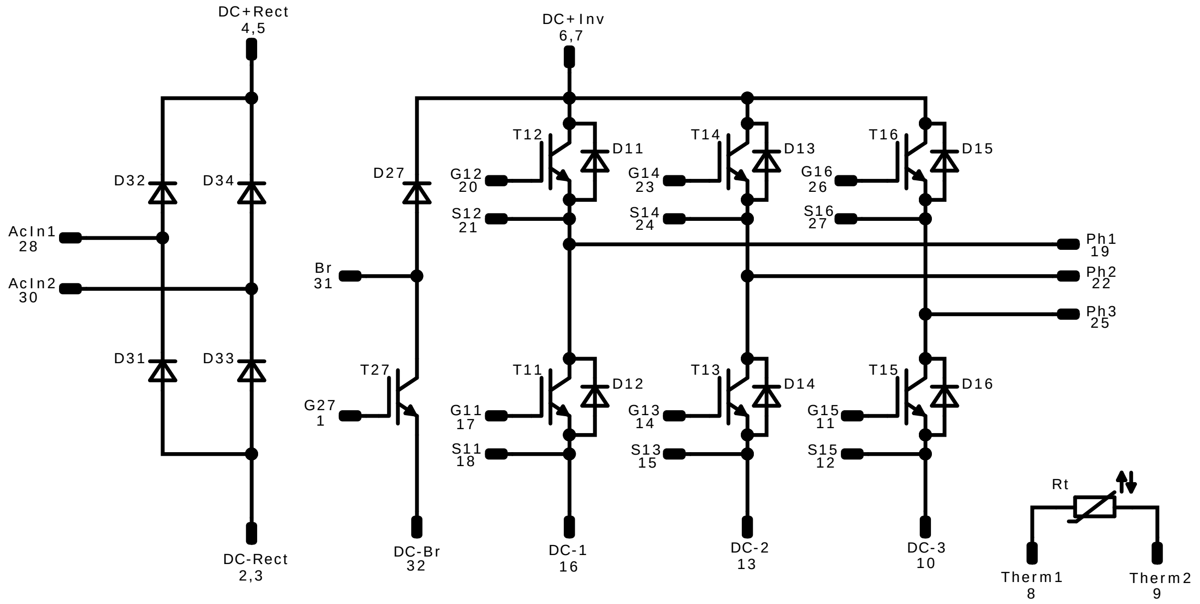
Outline

Pin table [mm]

Pin	X	Y	Function
1	52,55	0	G27
2	47,7	0	DC-Rect
3	44,8	0	DC-Rect
4	37,8	0	DC+Rect
5	37,8	2,8	DC+Rect
6	35	0	DC+Inv
7	35	2,8	DC+Inv
8	28	0	Therm1
9	25,2	0	Therm2
10	22,4	0	DC-3
11	19,6	0	G15
12	16,8	0	S15
13	14	0	DC-2
14	11,2	0	G13
15	8,4	0	S13
16	5,6	0	DC-1
17	2,8	0	G11
18	0	0	S11
19	0	28,5	Ph1
20	2,8	28,5	G12
21	7,5	28,5	S12
22	14,5	28,5	Ph2
23	17,3	28,5	G14
24	22	28,5	S14
25	29	28,5	Ph3
26	31,8	28,5	G16
27	36,5	28,5	S16
28	43,5	28,5	ACIn1
29	not assembled		
30	52,55	16,9	ACIn2
31	52,55	8,6	Br
32	52,55	2,8	DC-Br



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14, T15, T16	IGBT	650 V	40 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	FWD	650 V	40 A	Inverter Diode	
T27	IGBT	650 V	40 A	Brake Switch	
D27	FWD	650 V	20 A	Brake Diode	
D31, D32, D33, D34	Rectifier	1600 V	35 A	Rectifier Diode	
Rt	Thermistor			Thermistor	

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

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

Package data
Package data for *flow* 1 packages see vincotech.com website.

Vincotech thermistor reference
See Vincotech thermistor reference table at vincotech.com website.

UL recognition and file number
This device is UL 1557 recognized under E192116 up to a junction temperature under switching condition $T_{j,op}$=175°C and up to 3500VAC/1min isolation voltage. For more information see vincotech.com website.

Document No.:	**Date:**	**Modification:**	**Pages**
10-PY07PMA040I7-P585B68Y-D1-14	10 Jun. 2025	Initial Release	