10-ZB077PA030S5-PH74E58

datasheet

***flow*7PACK 0B** **650 V / 30 A**

Topology features

- Brake+Inverter
- Open Emitter configuration
- Temperature sensor

Component features

- High speed and smooth switching
- Low gate charge
- Very low collector emitter saturation voltage

Housing features

- Base isolation: Al_2O_3
- Single screw heat sink mounting
- Ultra-compact design
- Thermo-mechanical push-and-pull force relief
- Solder pin

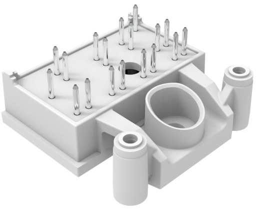
Target applications

- Servo Drives

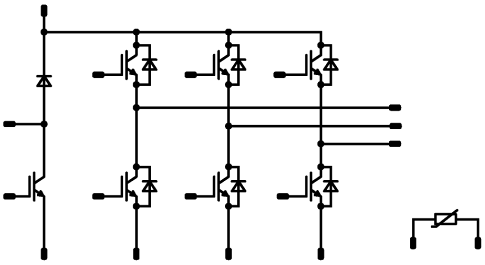
Types

- 10-ZB077PA030S5-PH74E58

flow 0B 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	35	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		90	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	56	W
Gate-emitter voltage	V_{GES}			±20	V
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	24	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		40	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	39	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	27	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		60	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	45	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	21	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	33	W
Maximum junction temperature	T_{jmax}			175	°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				8,66	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	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0003	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		30	25 125 150		1,35 1,45 1,47	1,75(1)	V
Collector-emitter cut-off current	I_{CES}		0	650		25			50	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		1800		pF
Output capacitance	C_{oes}							55		pF
Reverse transfer capacitance	C_{res}							7		pF
Gate charge	Q_{g}	V_{CC} = 520 V	15		30	25		70		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,69		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 12,8 Ω R_{goff} = 12,8 Ω	-5/15	350	30	25 125 150		33,6 33,35 33,42		ns
Rise time	t_{r}					25 125 150		16,9 17,57 17,62		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		89,29 105,45 109,37		ns
Fall time	t_{f}					25 125 150		9,19 13 14,78		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,631 µC Q_{rFWD}=1,29 µC Q_{rFWD}=1,49 µC				25 125 150		0,416 0,549 0,588		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,288 0,467 0,517		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				20	25 125 150		1,56 1,51 1,51	1,92(1)	V
Reverse leakage current	I_R	V_r = 650 V				25			1,28	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						2,44		K/W
Dynamic										
Peak recovery current	I_{RM}	di/dt=1008 A/µs di/dt=1331 A/µs di/dt=1329 A/µs	-5/15	350	30	25 125 150		18,08 23,14 24,76		A
Reverse recovery time	t_{rr}					25 125 150		75,23 104,38 115,37		ns
Recovered charge	Q_r					25 125 150		0,631 1,29 1,49		µC
Reverse recovered energy	E_{rec}					25 125 150		0,148 0,317 0,377		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		206,1 208,74 209,33		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	$V_{GE(th)}$	V_{CE} = V_{GE}			0,0002	25	4,35	5	5,65	V
Collector-emitter saturation voltage	V_{CEsat}		15		20	25 125 150		1,32 1,4 1,43	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		1310		pF
Output capacitance	C_{oes}							42		pF
Reverse transfer capacitance	C_{res}							13		pF
Gate charge	Q_g	V_{CC} = 520 V	15		20	25		128		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						2,11		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 12,8 Ω R_{goff} = 12,8 Ω	0/15	400	30	25 125 150		24,54 25,78 25,99		ns
Rise time	t_r					25 125 150		22,53 23,94 24,11		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		193,14 215,72 221,06		ns
Fall time	t_f					25 125 150		8,33 16,93 73,95		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,541 µC Q_{rFWD}=1,17 µC Q_{rFWD}=1,37 µC				25 125 150		0,666 0,919 0,976		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,499 0,739 0,797		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		1,71	2(1)	V
						125		1,6		
						150		1,55		
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} = 3,4 W/mK (PSX)						2,9		K/W
Dynamic										
Peak recovery current	I_{RM}	d*i*/d*t*=1250 A/µs d*i*/d*t*=865 A/µs d*i*/d*t*=1023 A/µs	0/15	400	30	25		10,63		A
						125		14,33		
						150		15,46		
Reverse recovery time	t_{rr}					25		93,96		ns
						125		131,32		
						150		145,59		
Recovered charge	Q_r					25		0,541		µC
						125		1,17		
						150		1,37		
Reverse recovered energy	E_{rec}					25		0,124		mWs
						125		0,288		
						150		0,341		
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25		71,83		A/µs
						125		228,81		
						150		194,32		

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_{F} [V]	I_{C} [A] I_{D} [A] I_{F} [A]	T_{j} [°C]	Min	Typ	Max	
Thermistor										
Static										
Rated resistance	R					25		22		kΩ
Deviation of 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

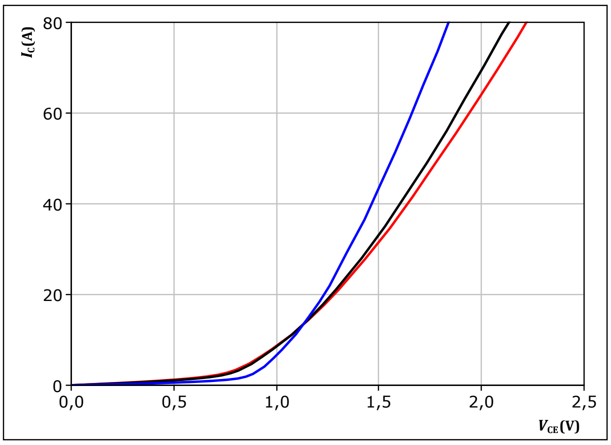
(2) Only valid with pre-applied Vincotech thermal interface material.

Inverter Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



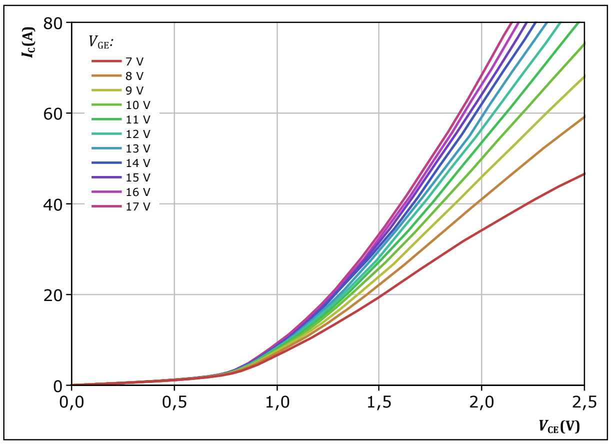
t_p = 250 µs
V_{GE} = 15 V

T_j: 25 °C
125 °C
150 °C

figure 2. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

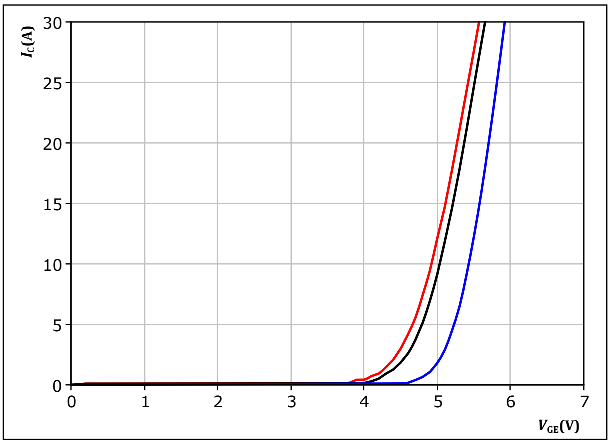


t_p = 250 µs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})



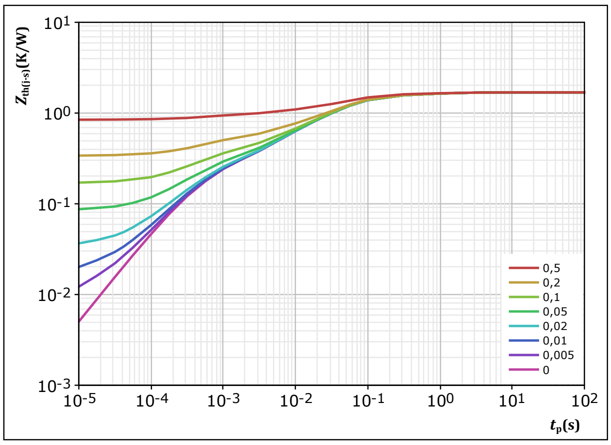
t_p = 250 µs
V_{CE} = 30 V

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
$R_{th(j-s)}$ = 1,689 K/W

IGBT thermal model values

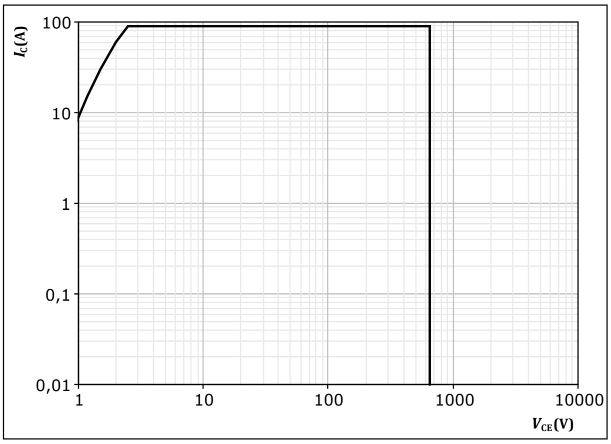
R (K/W)	τ (s)
1,11E-01	1,18E+00
2,75E-01	1,47E-01
8,32E-01	3,79E-02
2,74E-01	5,90E-03
1,97E-01	4,49E-04

Inverter Switch Characteristics

figure 5. **IGBT**

Safe operating area

I_C = f(V_{CE})

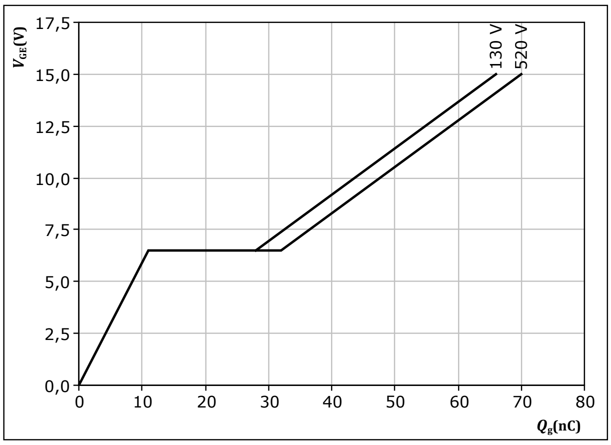


D = single pulse
T_s = 80 °C
V_{GE} = 15 V
T_j = T_{jmax}

figure 6. **IGBT**

Gate voltage vs gate charge

V_{GE} = f(Q_g)



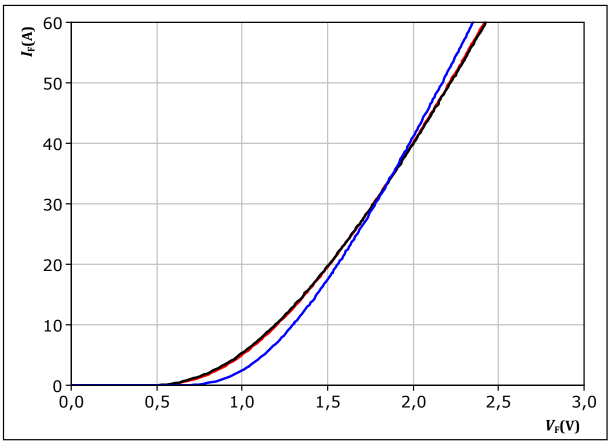
I_C = 30 A
T_j = 25 °C

Inverter Diode Characteristics

figure 7. **FWD**

Typical forward characteristics

I_F = f(V_F)



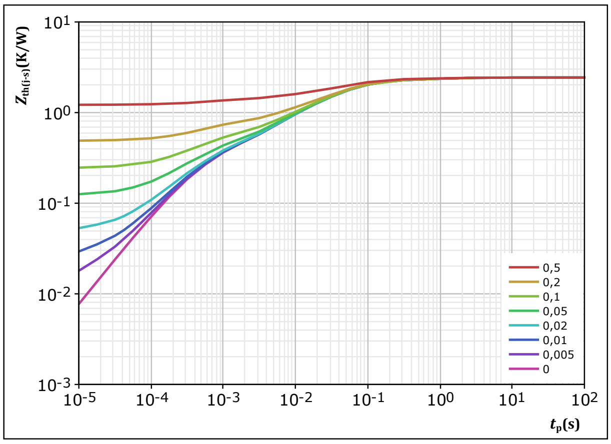
t_p = 250 µs

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

$R_{th(j-s)}$ = 2,435 K/W

FWD thermal model values

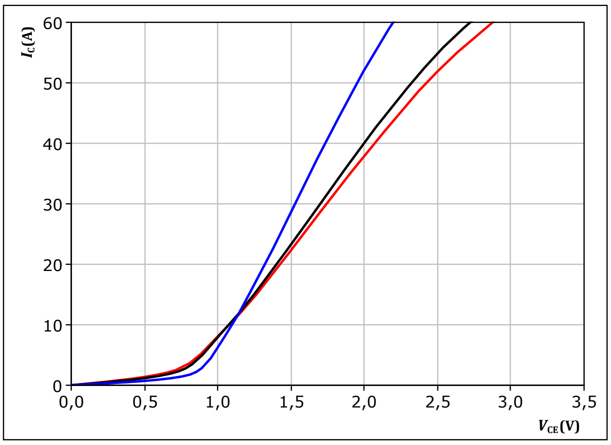
R (K/W)	τ (s)
1,50E-01	1,32E+00
4,95E-01	1,15E-01
1,05E+00	3,31E-02
4,44E-01	6,23E-03
2,91E-01	4,33E-04

Brake Switch Characteristics

figure 9. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



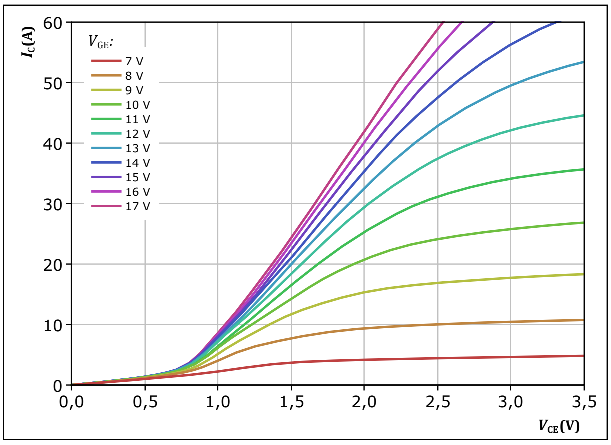
t_p = 250 µs
V_{GE} = 15 V

T_j:
25 °C
125 °C
150 °C

figure 10. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

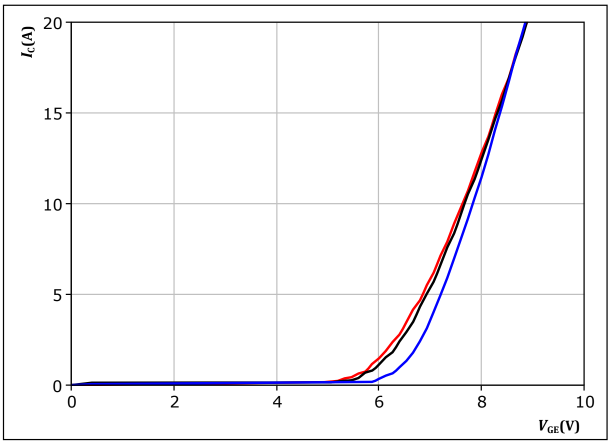


t_p = 250 µs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 11. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$



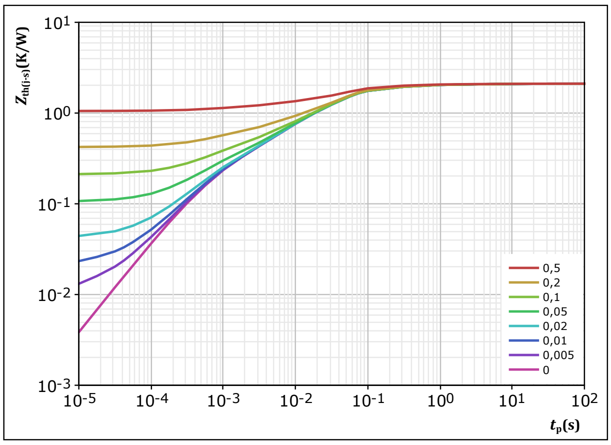
t_p = 250 µs
V_{CE} = 9 V

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
$R_{th(j-s)}$ = 2,108 K/W

IGBT thermal model values

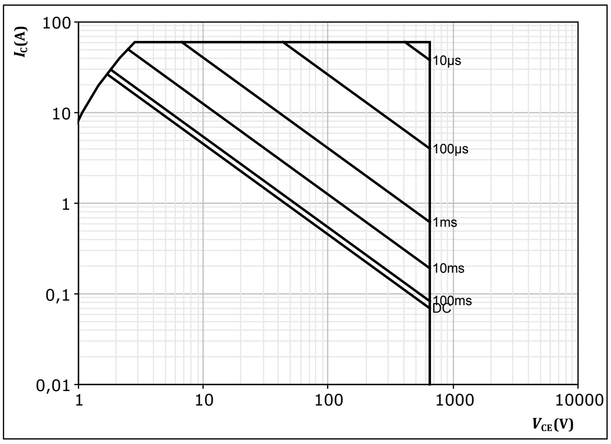
R (K/W)	τ (s)
5,43E-02	6,70E+00
2,44E-01	3,83E-01
1,28E+00	4,07E-02
3,51E-01	5,30E-03
1,79E-01	6,22E-04

Brake Switch Characteristics

figure 13. **IGBT**

Safe operating area

I_C = f(V_{CE})



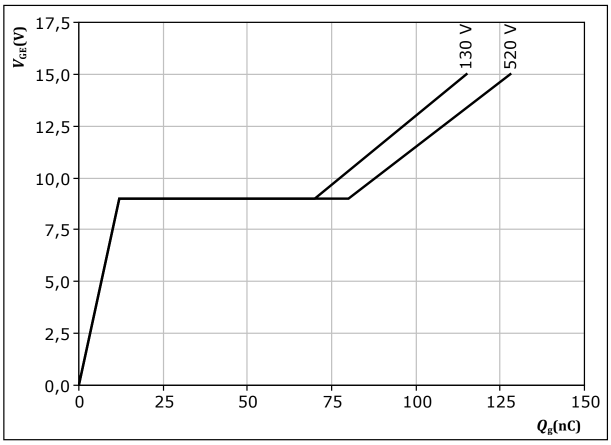
D = single pulse

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)



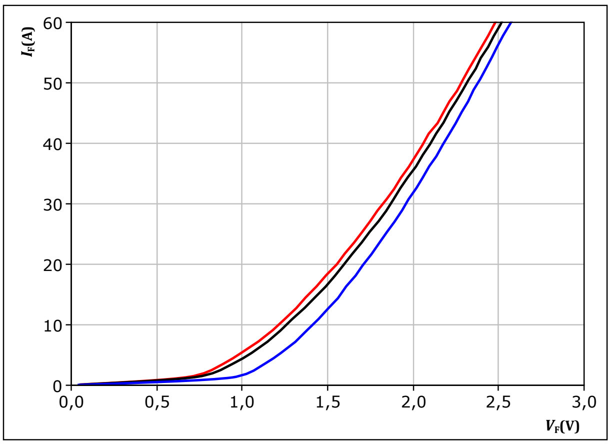
I_C =	20	A
T_j =	25	°C

Brake Diode Characteristics

figure 15. **FWD**

Typical forward characteristics

I_F = f(V_F)



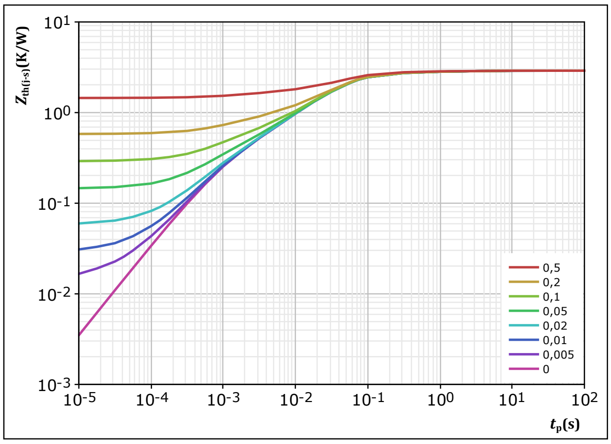
t_p = 250 μs

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

$R_{th(j-s)}$ = 2,898 K/W

FWD thermal model values

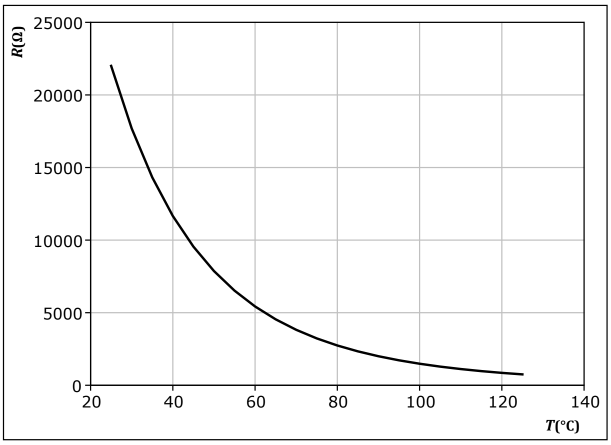
R (K/W)	τ (s)
1,06E-01	2,42E+00
3,41E-01	2,00E-01
1,80E+00	3,86E-02
4,06E-01	7,48E-03
2,46E-01	9,92E-04

Thermistor Characteristics

figure 17. **Thermistor**

Typical NTC characteristic as function of temperature

R_T = f(T)

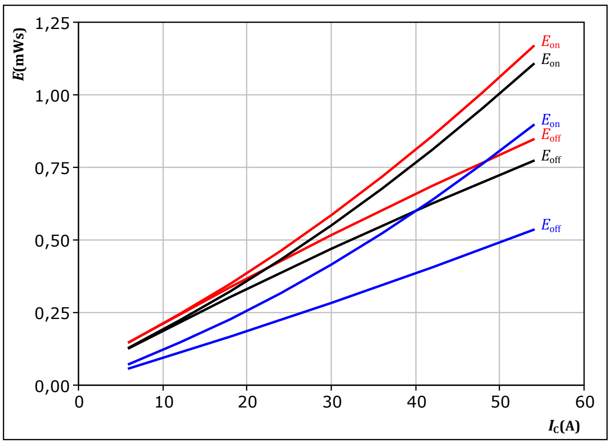


Inverter Switching Characteristics

figure 18. IGBT

Typical switching energy losses as a function of collector current

E = f(I_C)



With an inductive load at

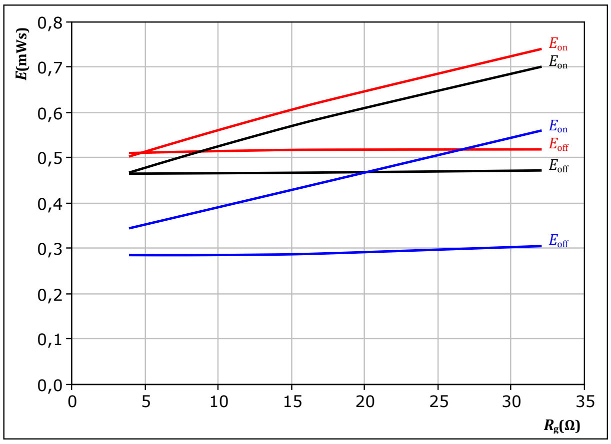
V_{CE} = 350 V
V_{GE} = -5/15 V
R_{gon} = 12,8 Ω
R_{goff} = 12,8 Ω

T_j:
— 25 °C
— 125 °C
— 150 °C

figure 19. IGBT

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

E = f(R_g)



With an inductive load at

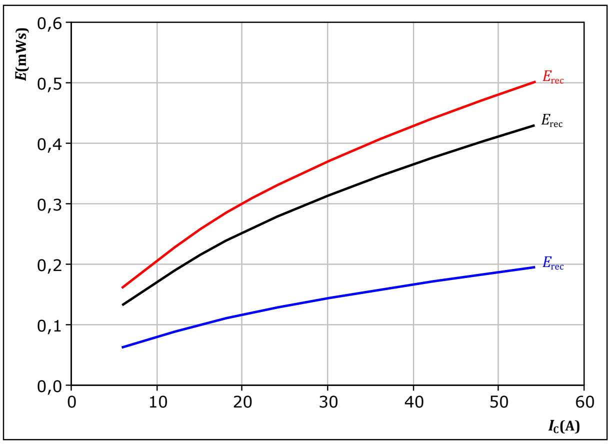
V_{CE} = 350 V
V_{GE} = -5/15 V
I_C = 30 A

T_j:
— 25 °C
— 125 °C
— 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

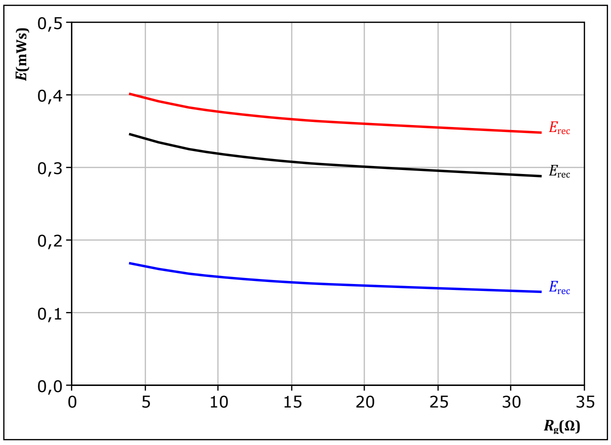
V_{CE} = 350 V
V_{GE} = -5/15 V
R_{gon} = 12,8 Ω

T_j:
— 25 °C
— 125 °C
— 150 °C

figure 21. 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
V_{GE} = -5/15 V
I_C = 30 A

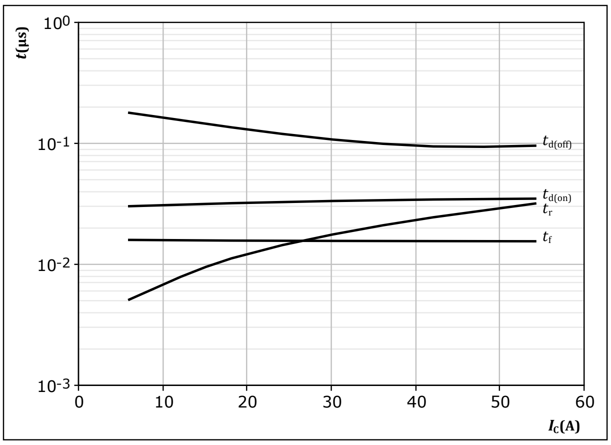
T_j:
— 25 °C
— 125 °C
— 150 °C

Inverter Switching Characteristics

figure 22. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



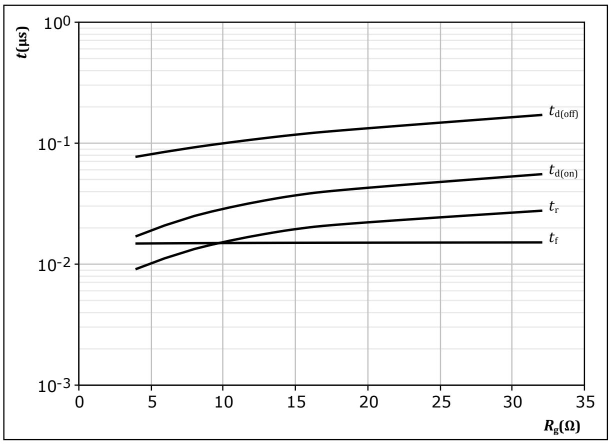
With an inductive load at

T_j = 150 °C
V_{CE} = 350 V
V_{GE} = -5/15 V
R_{gon} = 12,8 Ω
R_{goff} = 12,8 Ω

figure 23. **IGBT**

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

t = f(R_g)



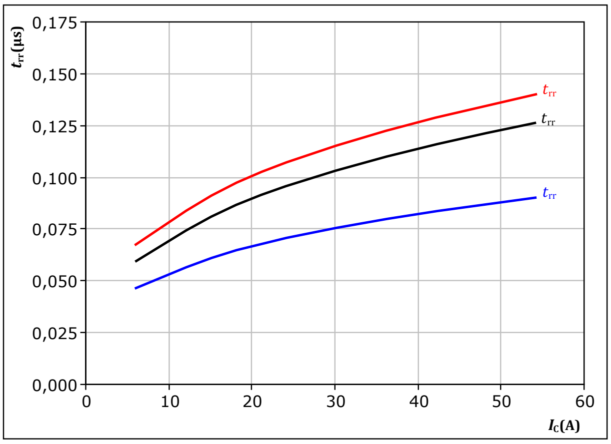
With an inductive load at

T_j = 150 °C
V_{CE} = 350 V
V_{GE} = -5/15 V
I_C = 30 A

figure 24. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

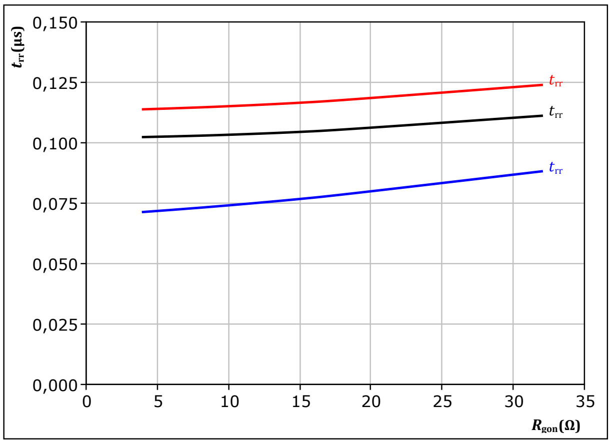
V_{CE} = 350 V
V_{GE} = -5/15 V
R_{gon} = 12,8 Ω

T_j:
25 °C
125 °C
150 °C

figure 25. **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 = 30 A

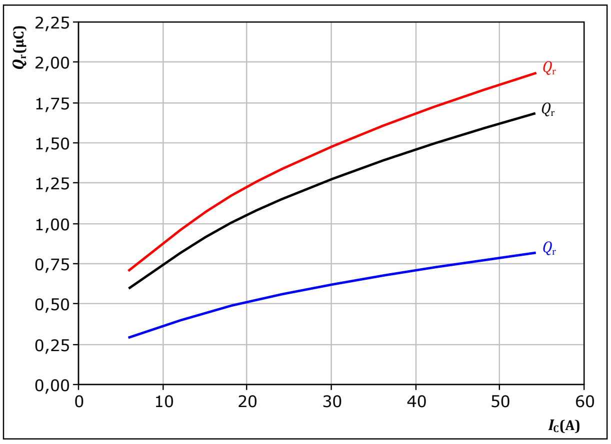
T_j:
25 °C
125 °C
150 °C

Inverter Switching Characteristics

figure 26. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



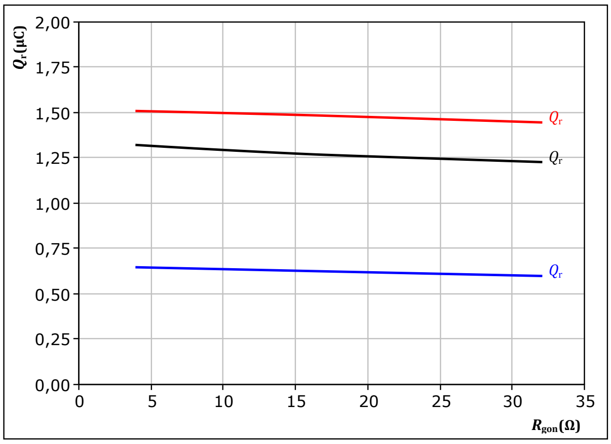
With an inductive load at
V_{CE} = 350 V
V_{GE} = -5/15 V
R_{gon} = 12,8 Ω

T_j:
25 °C
125 °C
150 °C

figure 27. **FWD**

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

Q_r = f(R_{gon})



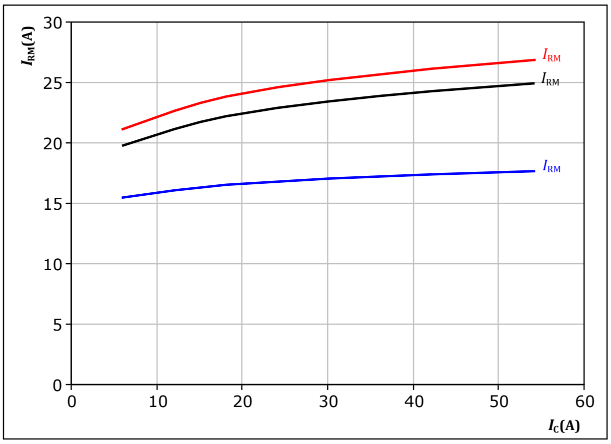
With an inductive load at
V_{CE} = 350 V
V_{GE} = -5/15 V
I_C = 30 A

T_j:
25 °C
125 °C
150 °C

figure 28. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



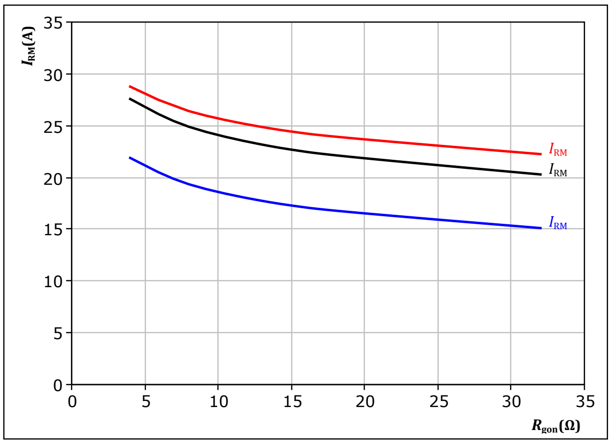
With an inductive load at
V_{CE} = 350 V
V_{GE} = -5/15 V
R_{gon} = 12,8 Ω

T_j:
25 °C
125 °C
150 °C

figure 29. **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
V_{GE} = -5/15 V
I_C = 30 A

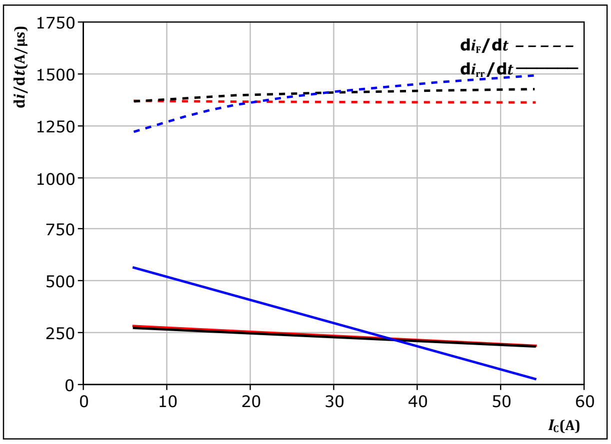
T_j:
25 °C
125 °C
150 °C

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

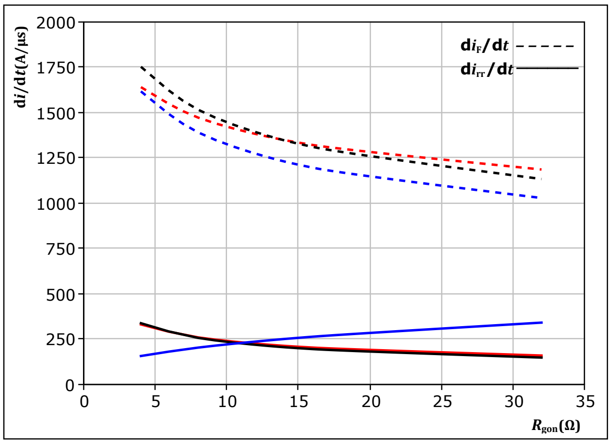
V_{CE} = 350 V
V_{GE} = -5/15 V
R_{gon} = 12,8 Ω

T_j:
25 °C
125 °C
150 °C

figure 31. **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

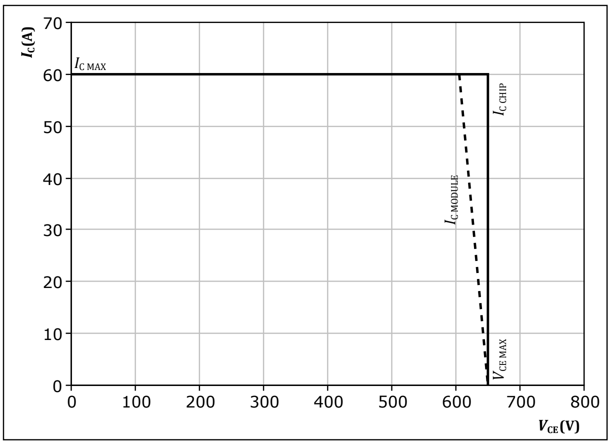
V_{CE} = 350 V
V_{GE} = -5/15 V
I_C = 30 A

T_j:
25 °C
125 °C
150 °C

figure 32. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



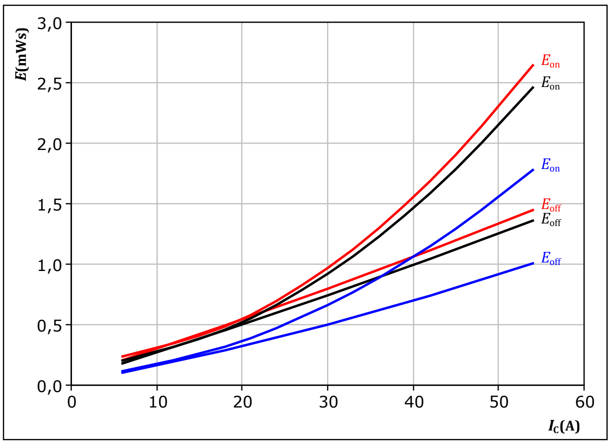
At
T_j = 150 °C
R_{gon} = 12,8 Ω
R_{goff} = 12,8 Ω

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

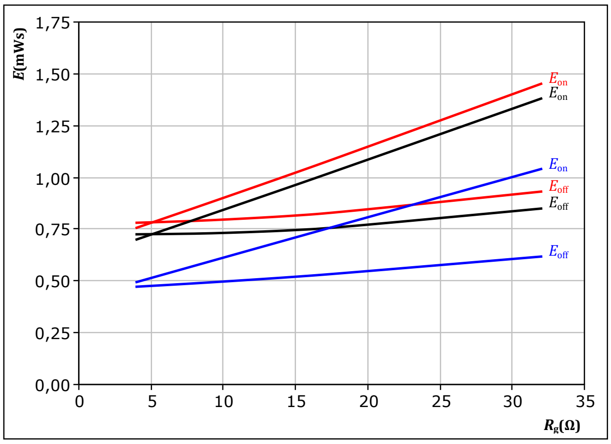
V_{CE} = 400 V
V_{GE} = 0/15 V
R_{gon} = 12,8 Ω
R_{goff} = 12,8 Ω

T_j:
25 °C
125 °C
150 °C

figure 34. **IGBT**

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

E = f(R_g)



With an inductive load at

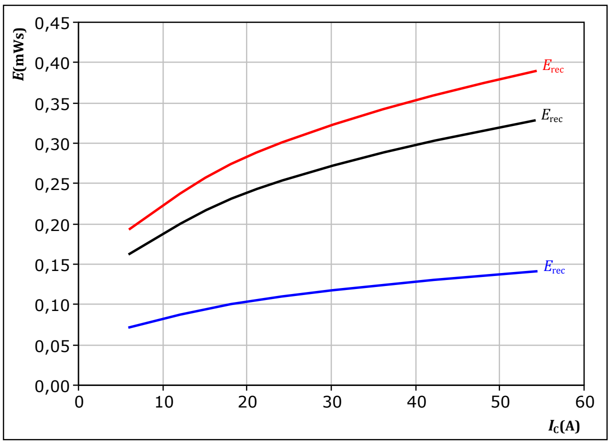
V_{CE} = 400 V
V_{GE} = 0/15 V
I_C = 30 A

T_j:
25 °C
125 °C
150 °C

figure 35. **FWD**

Typical reverse recovered energy loss as a function of collector current

E_{rec} = f(I_C)



With an inductive load at

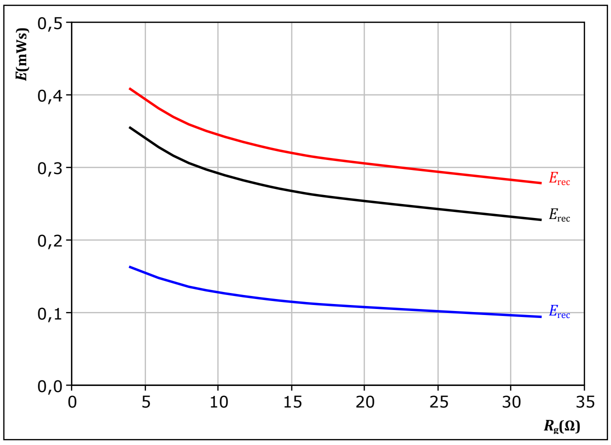
V_{CE} = 400 V
V_{GE} = 0/15 V
R_{gon} = 12,8 Ω

T_j:
25 °C
125 °C
150 °C

figure 36. **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
V_{GE} = 0/15 V
I_C = 30 A

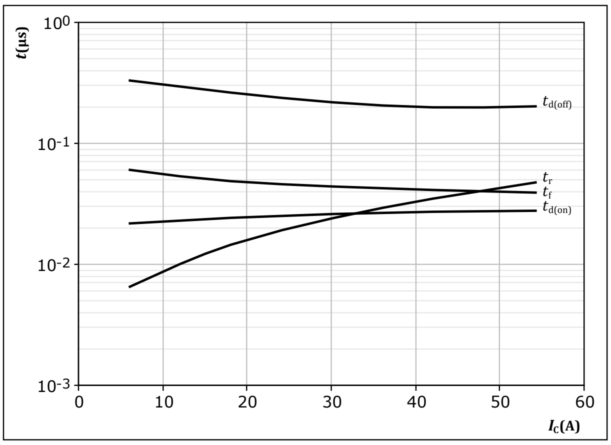
T_j:
25 °C
125 °C
150 °C

Brake Switching Characteristics

figure 37. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



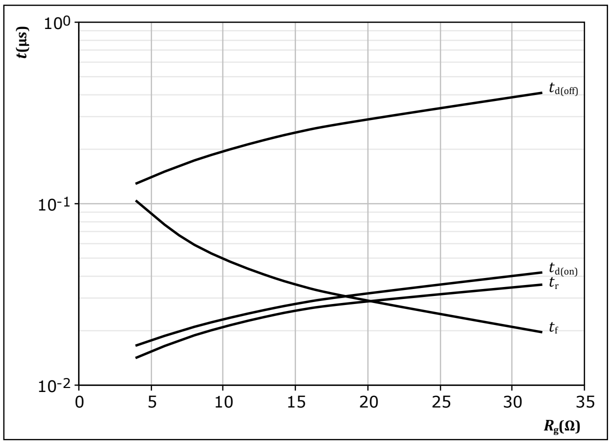
With an inductive load at

T_j = 150 °C
V_{CE} = 400 V
V_{GE} = 0/15 V
R_{gon} = 12,8 Ω
R_{goff} = 12,8 Ω

figure 38. **IGBT**

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

$t = f(R_g)$



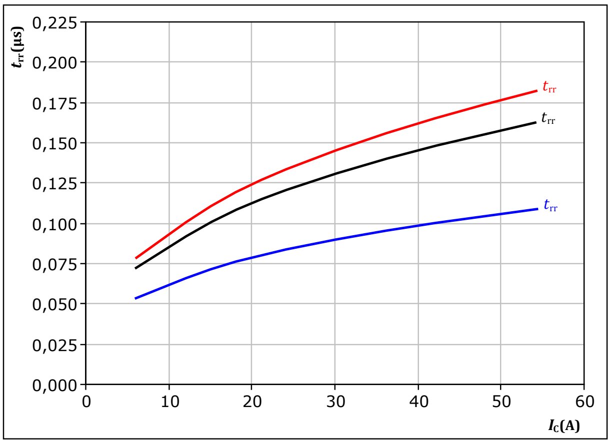
With an inductive load at

T_j = 150 °C
V_{CE} = 400 V
V_{GE} = 0/15 V
I_C = 30 A

figure 39. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



With an inductive load at

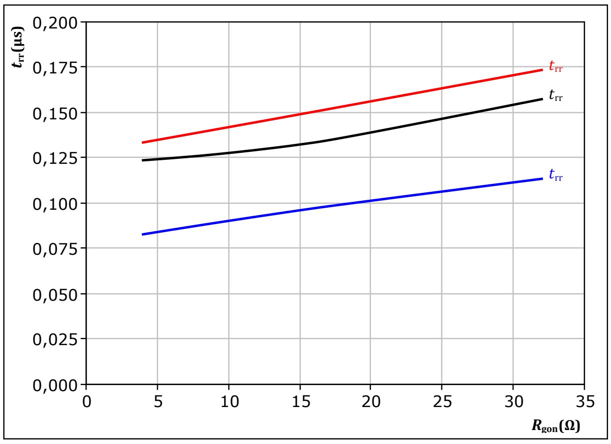
V_{CE} = 400 V
V_{GE} = 0/15 V
R_{gon} = 12,8 Ω

T_j:
— 25 °C
— 125 °C
— 150 °C

figure 40. **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 = 30 A

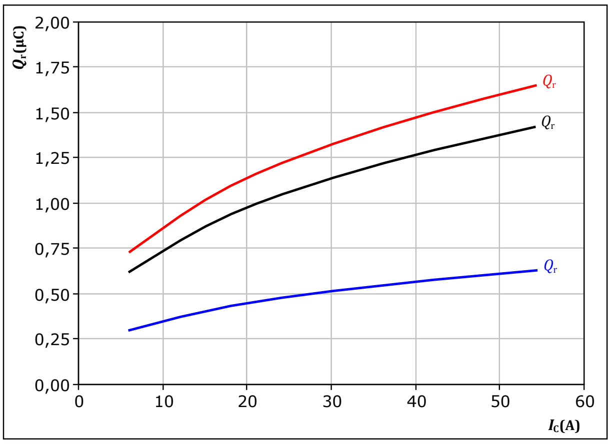
T_j:
— 25 °C
— 125 °C
— 150 °C

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

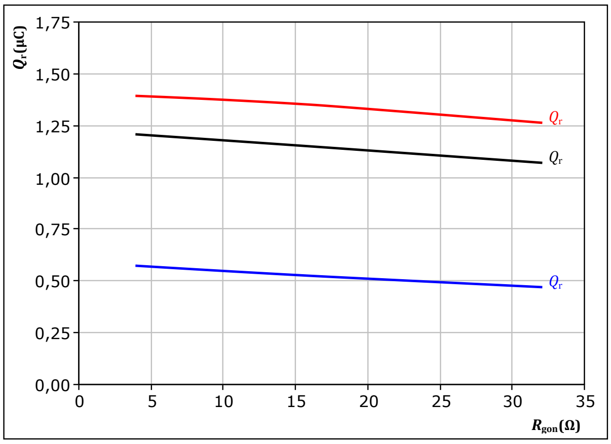
V_{CE} = 400 V
V_{GE} = 0/15 V
R_{gon} = 12,8 Ω

T_j:
25 °C
125 °C
150 °C

figure 42. **FWD**

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

Q_r = f(R_{gon})



With an inductive load at

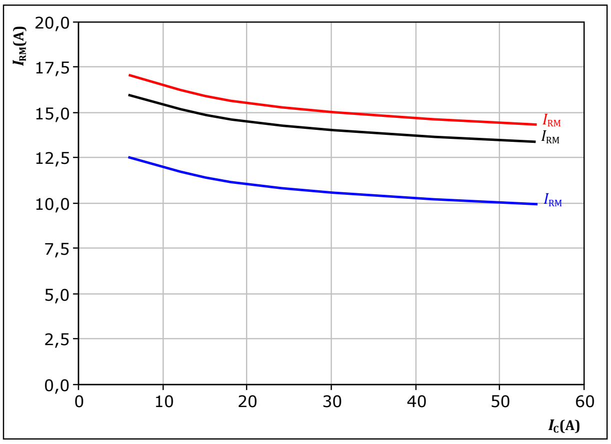
V_{CE} = 400 V
V_{GE} = 0/15 V
I_C = 30 A

T_j:
25 °C
125 °C
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

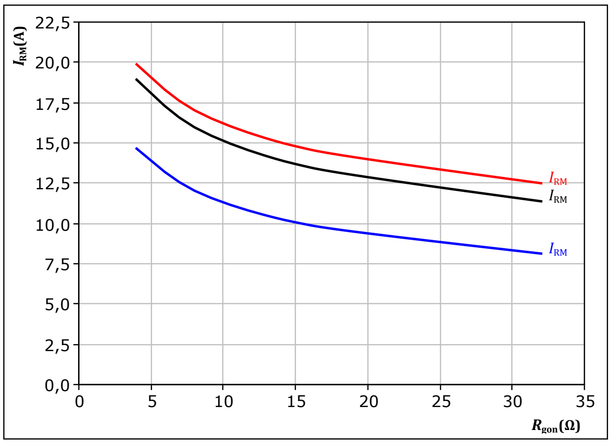
V_{CE} = 400 V
V_{GE} = 0/15 V
R_{gon} = 12,8 Ω

T_j:
25 °C
125 °C
150 °C

figure 44. **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 = 30 A

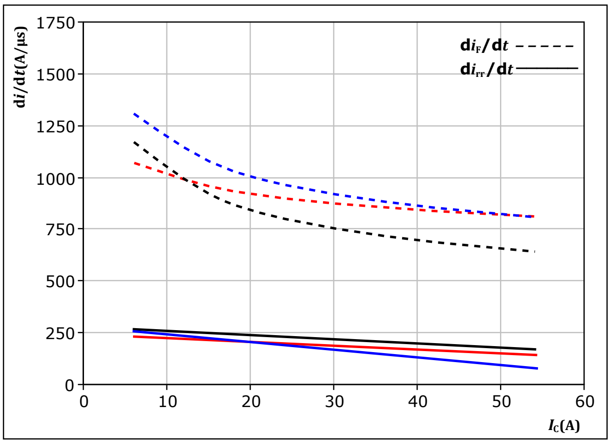
T_j:
25 °C
125 °C
150 °C

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} = 400 V

V_{GE} = 0/15 V

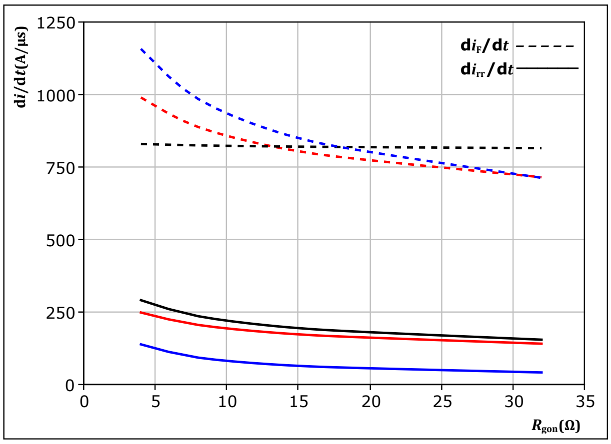
R_{gon} = 12,8 Ω

T_j: 25 °C, 125 °C, 150 °C

figure 46. **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

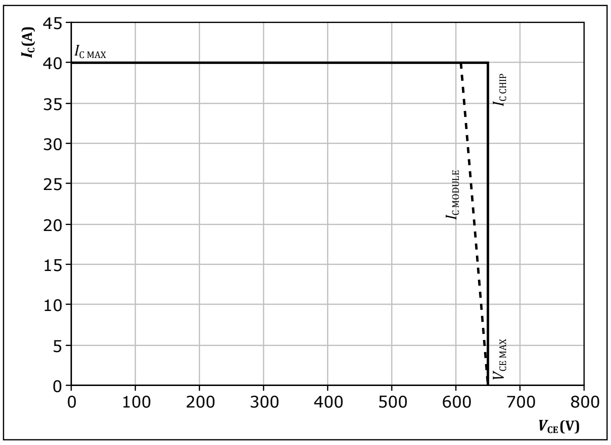
I_C = 30 A

T_j: 25 °C, 125 °C, 150 °C

figure 47. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At T_j = 150 °C

R_{gon} = 12,8 Ω

R_{goff} = 12,8 Ω

Switching Definitions

figure 48. **IGBT**

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

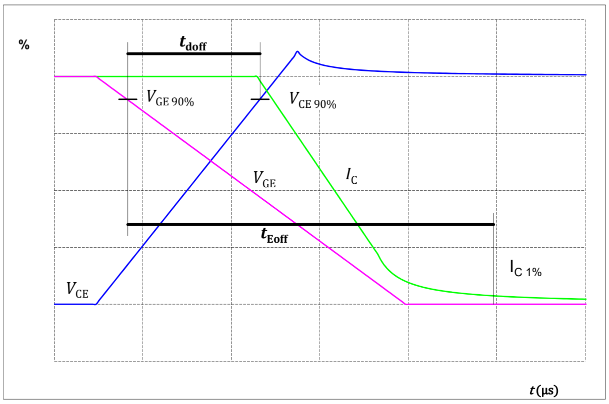


figure 49. **IGBT**

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

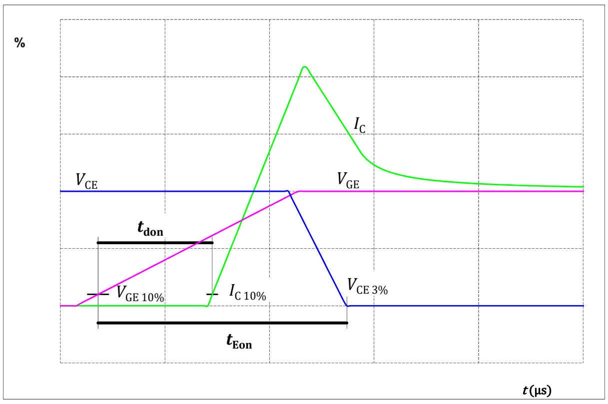


figure 50. **IGBT**

Turn-off Switching Waveforms & definition of t_f

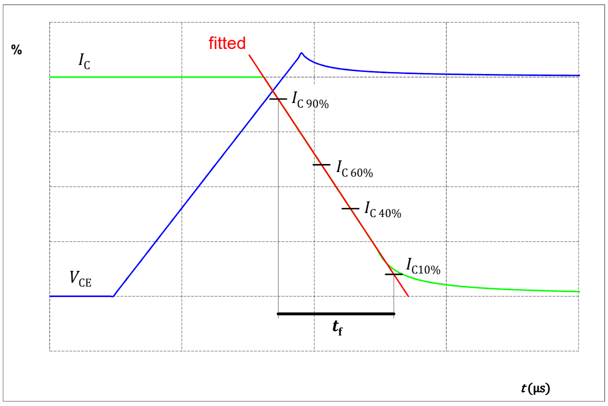
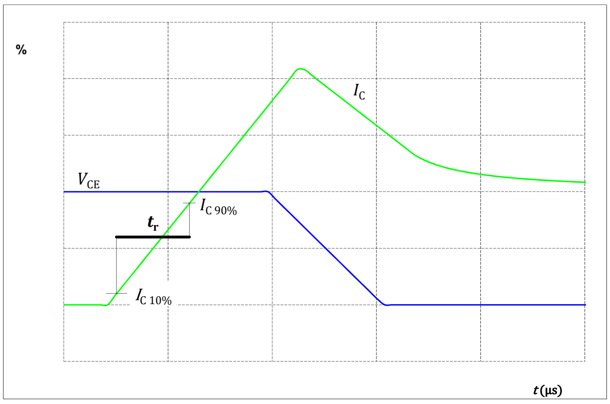


figure 51. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Switching Definitions

figure 52. **FWD**

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

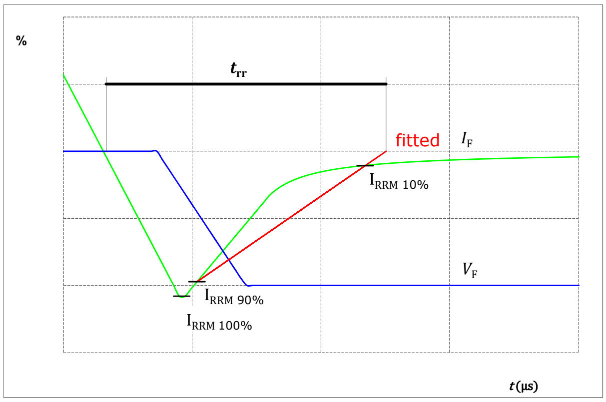
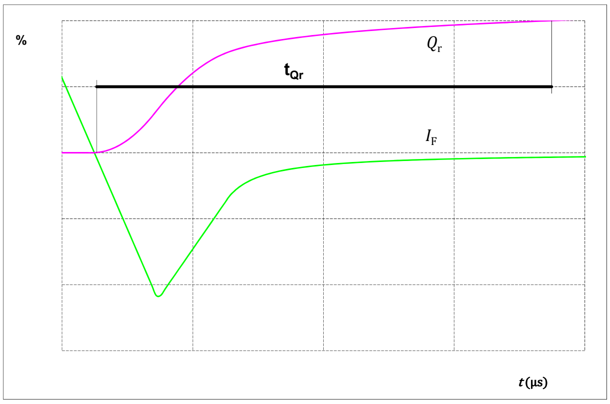


figure 53. **FWD**

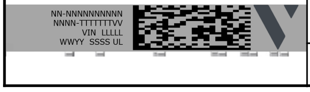
Turn-on Switching Waveforms & definition of t_{Qr} **(** t_{Qr} **= integrating time for** Q_r**)**



Ordering Code

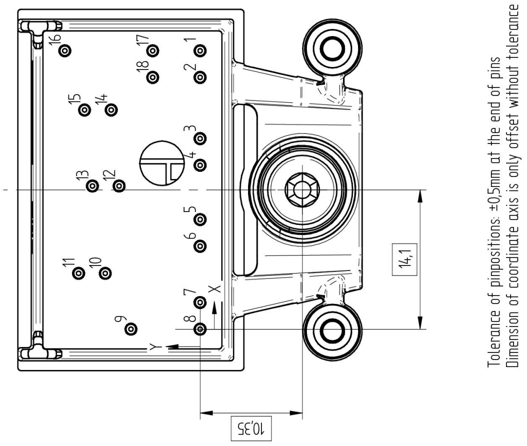
Version	Ordering Code
Without thermal paste	10-ZB077PA030S5-PH74E58
With thermal paste (3,4 W/mK, PSX-P7)	10-ZB077PA030S5-PH74E58-/3/

Marking

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

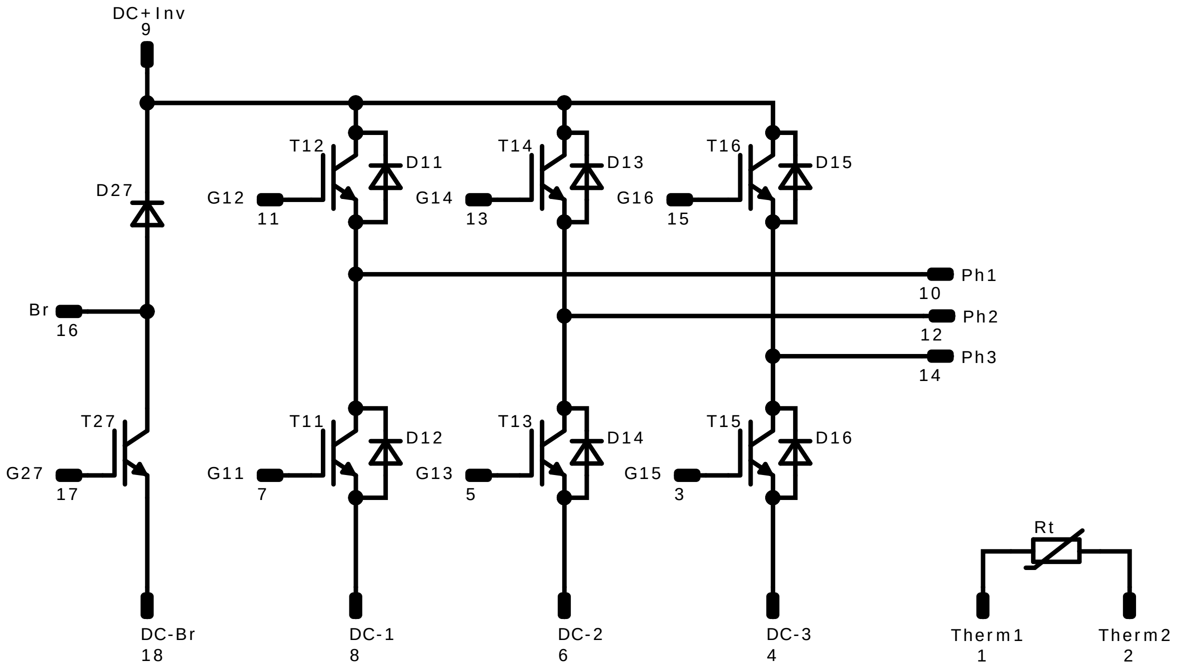
Outline

Pin table [mm]			
Pin	X	Y	Function
1	28,2	0	Therm1
2	25,5	0	Therm2
3	19,3	0	G15
4	16,6	0	DC-3
5	11,1	0	G13
6	8,4	0	DC-2
7	2,7	0	G11
8	0	0	DC-1
9	0	7	DC+Inv
10	5,65	9,6	Ph1
11	5,65	12,3	G12
12	14,5	8,2	Ph2
13	14,5	10,9	G14
14	22,2	9	Ph3
15	22,2	11,7	G16
16	28,2	13,7	Br
17	28,2	4,8	G27
18	25,5	4,8	DC-Br



Tolerance of pinpositions: ±0,5mm at the end of 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	650 V	30 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	FWD	650 V	20 A	Inverter Diode	
T27	IGBT	650 V	20 A	Brake Switch	
D27	FWD	650 V	20 A	Brake Diode	
Rt	Thermistor			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 160	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* 0B packages see vincotech.com website.

Package data
Package data for *flow* 0B 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
10-ZB077PA030S5-PH74E58-D1-14	24 Jul. 2023		

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.