Vincotech

80-M312WPA050SC-K889F41
datasheet

MiniSKiiP® PACK 3 **1200 V / 50 A**

Topology features

- Open Emitter configuration
- Temperature sensor
- 2xInverter

Component features

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

Housing features

- Base isolation: Al_2O_3
- Easy assembly in one mounting step
- Flexible PCB design w/o pin holes
- Rugged solderless spring contacts

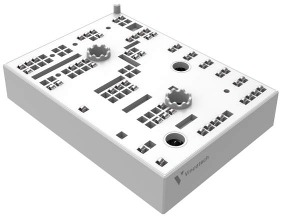
Target applications

- Industrial Drives

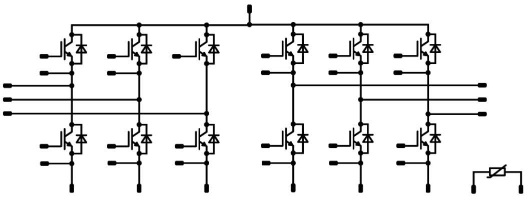
Types

- 80-M312WPA050SC-K889F41

MiniSKiiP® 3 16 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	61	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	163	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V, V_{CC} = 800 V	T_j = 150 °C	10	µs
Maximum junction temperature	T_{jmax}			175	°C
Inverter Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	53	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	270	A
Surge current capability	I^2t			365	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	123	W
Maximum junction temperature	T_{jmax}			175	°C
Inverter Switch 2					
Collector-emitter voltage	V_{CES}			1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	61	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	163	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V, V_{CC} = 800 V	T_j = 150 °C	10	µs
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Inverter Diode 2					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	53	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	270	A
Surge current capability	I^2t			365	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	123	W
Maximum junction temperature	T_{jmax}			175	°C

Module Properties

Parameter	Symbol	Conditions		Value	Unit
Thermal Properties					
Storage temperature	T_{stg}			-40…+125	°C
Operation temperature under switching condition	T_{jop}			-40…+(T_{jmax} - 25)	°C
Isolation Properties					
Isolation voltage	V_{isol}	DC Test Voltage*	t_p = 2 s	5500	V
Isolation voltage	V_{isol}	AC Voltage	t_p = 1 min	2500	V
Creepage distance		With std lid For more informations see handling instructions		6,3	mm
Clearance		With std lid For more informations see handling instructions		6,3	mm
Comparative Tracking Index	CTI			≥ 600	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Inverter Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0017	25	5,3	5,8	6,3	V
Collector-emitter saturation voltage	V_{CEsat}		15		50	25 150	1,58	1,88 2,26	2,07(1)	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			1	µA
Gate-emitter leakage current	I_{GES}		20	0		25			120	nA
Internal gate resistance	r_g							4		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	25		25		2800		pF
Reverse transfer capacitance	C_{res}	f = 1 Mhz	0	25		25		100		pF
Gate charge	Q_g		±15		0	25		380		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 2,5 W/mK (HPTP)						0,58		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 8 Ω R_{goff} = 8 Ω	±15	600	50	25 125 150		99,86 102,84 103,78		ns
Rise time	t_r	R_{gon} = 8 Ω R_{goff} = 8 Ω	±15	600	50	25 125 150		27,45 30,5 31,41		ns
Turn-off delay time	$t_{d(off)}$	R_{gon} = 8 Ω R_{goff} = 8 Ω	±15	600	50	25 125 150		215,98 285,86 305,33		ns
Fall time	t_f	R_{gon} = 8 Ω R_{goff} = 8 Ω	±15	600	50	25 125 150		97,86 165,91 190,71		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=2,44 µC Q_{rFWD}=5,64 µC Q_{rFWD}=7,02 µC	±15	600	50	25 125 150		2,66 3,99 4,46		mWs
Turn-off energy (per pulse)	E_{off}		±15	600	50	25 125 150		3,42 5,59 6,27		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				50	25 125 150		2,22 2,31 2,21	2,54(1) 2,5(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25 150		 4400	60 8800	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 2,5 W/mK (HPTP)						0,77		K/W
Dynamic										
Peak recovery current	I_{RM}	di/dt=2045 A/µs di/dt=1845 A/µs di/dt=1852 A/µs	±15	600	50	25 125 150		45,53 55,83 60,58		A
Reverse recovery time	t_{rr}					25 125 150		172,37 345,38 396,52		ns
Recovered charge	Q_r					25 125 150		2,44 5,64 7,02		µC
Reverse recovered energy	E_{rec}					25 125 150		0,823 2,19 2,76		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		1906,71 1269,9 1138,37		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	
Inverter Switch 2										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0017	25	5,3	5,8	6,3	V
Collector-emitter saturation voltage	V_{CEsat}		15		50	25 150	1,58	1,88 2,26	2,07(1)	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			1	µA
Gate-emitter leakage current	I_{GES}		20	0		25			120	nA
Internal gate resistance	r_g							4		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	25		25		2800		pF
Reverse transfer capacitance	C_{res}							100		pF
Gate charge	Q_g		±15		0	25		380		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 2,5 W/mK (HPTP)						0,58		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 8 Ω R_{goff} = 8 Ω	±15	600	50	25 125 150		99,86 102,84 103,78		ns
Rise time	t_r					25 125 150		27,45 30,5 31,41		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		215,98 285,86 305,33		ns
Fall time	t_f					25 125 150		97,86 165,91 190,71		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=2,44 µC Q_{rFWD}=5,64 µC Q_{rFWD}=7,02 µC				25 125 150		2,66 3,99 4,46		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		3,42 5,59 6,27		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 2										
Static										
Forward voltage	V_F				50	25 125 150		2,22 2,31 2,21	2,54(1) 2,5(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25 150		 4400	60 8800	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 2,5 W/mK (HPTP)						0,77		K/W
Dynamic										
Peak recovery current	I_{RM}	di/dt=2045 A/µs di/dt=1845 A/µs di/dt=1852 A/µs	±15	600	50	25 125 150		45,53 55,83 60,58		A
Reverse recovery time	t_{rr}					25 125 150		172,37 345,38 396,52		ns
Recovered charge	Q_r					25 125 150		2,44 5,64 7,02		µC
Reverse recovered energy	E_{rec}					25 125 150		0,823 2,19 2,76		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		1906,71 1269,9 1138,37		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	
Thermistor										
Static										
Rated resistance	R					25		1		kΩ
Deviation of R100	$\Delta_{R/R}$	R_{100} = 1670 Ω				100	-2		2	%
Maximum Current	I_{max}							3		mA
Power dissipation constant	d					25		0,76		mW/K
A-value	A							$7{,}635 \times 10^{-3}$		1/K
B-value	B							$1{,}73 \times 10^{-5}$		$1/K^2$
Vincotech Thermistor Reference									E	

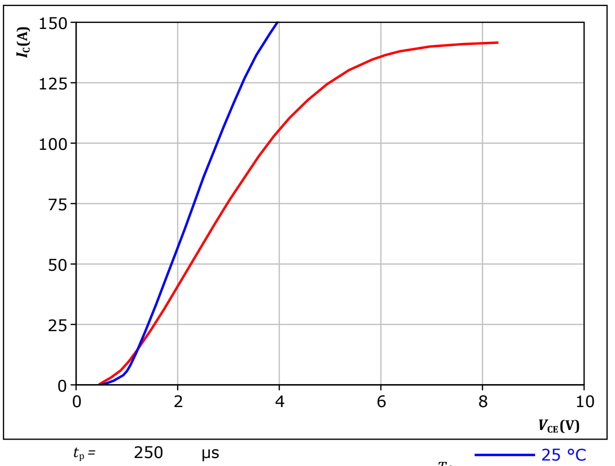
(1) Value at chip level
(2) Only valid with pre-applied Vincotech thermal interface material.

Inverter Switch Characteristics

figure 1. IGBT

Typical output characteristics

I_C = f(V_{CE})

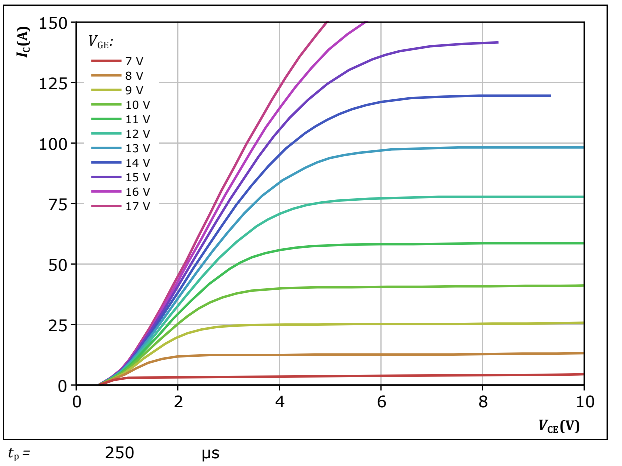


t_p =	250	µs	T_j:	25 °C
V_{GE} =	15	V		150 °C

figure 2. IGBT

Typical output characteristics

I_C = f(V_{CE})



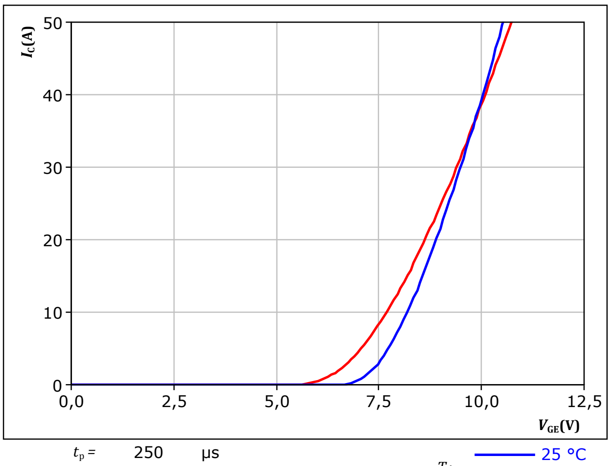
t_p =	250	µs
T_j =	150	°C

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

figure 3. IGBT

Typical transfer characteristics

I_C = f(V_{GE})

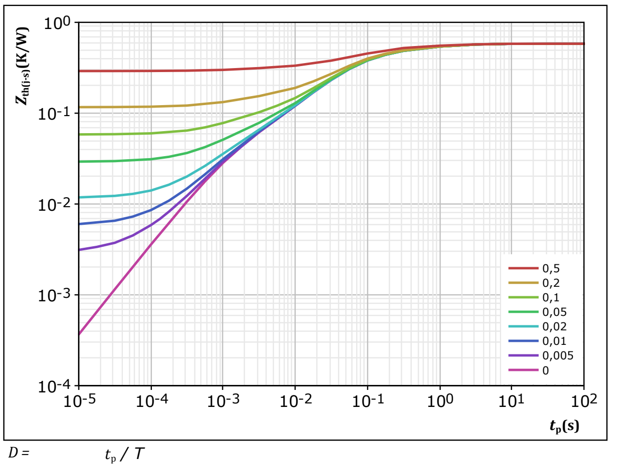


t_p =	250	µs	T_j:	25 °C
V_{CE} =	10	V		150 °C

figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,582	K/W

IGBT thermal model values

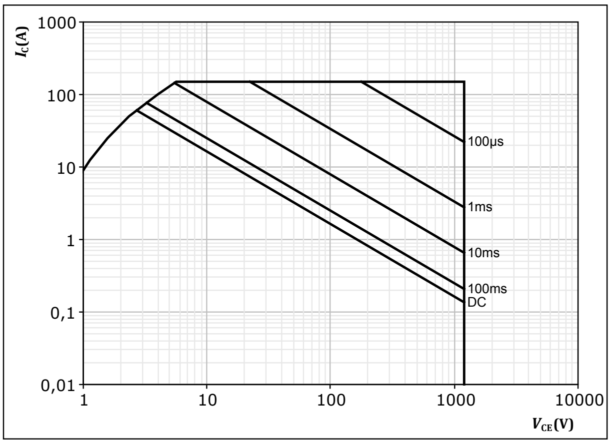
R (K/W)	τ (s)
4,21E-02	2,45E+00
1,10E-01	4,64E-01
3,06E-01	6,90E-02
9,13E-02	1,52E-02
3,27E-02	1,26E-03

Inverter Switch Characteristics

figure 5. **IGBT**

Safe operating area

I_C = f(V_{CE})



D = single pulse

T_s = 80 °C

V_{GE} = 15 V

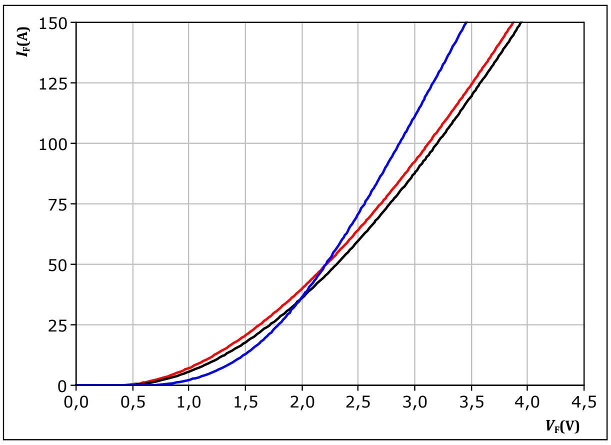
T_j = T_{jmax}

Inverter Diode Characteristics

figure 6. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



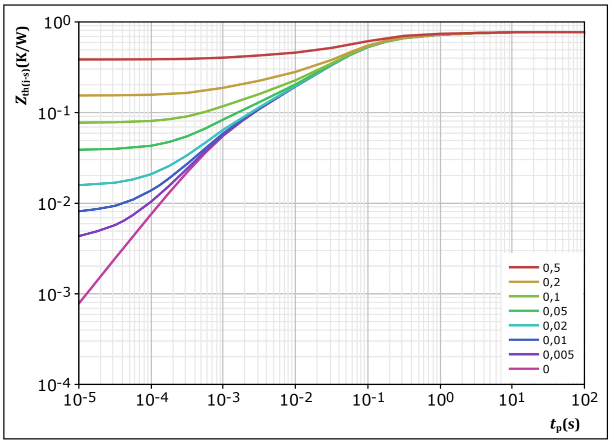
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 7. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,77 K/W

FWD thermal model values

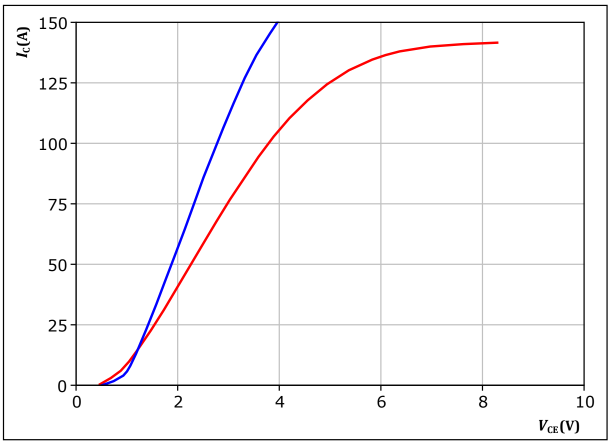
R (K/W)	τ (s)
6,81E-02	2,32E+00
1,41E-01	2,74E-01
4,03E-01	6,14E-02
1,01E-01	8,37E-03
5,84E-02	9,85E-04

Inverter Switch 2 Characteristics

figure 8. IGBT

Typical output characteristics

I_C = f(V_{CE})

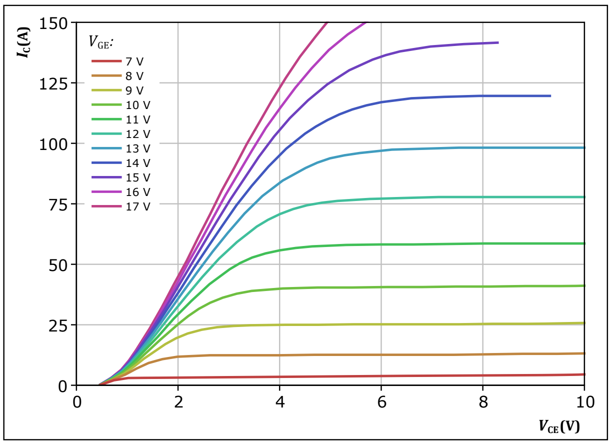


t_p = 250 µs
V_{GE} = 15 V
T_j: 25 °C, 150 °C

figure 9. IGBT

Typical output characteristics

I_C = f(V_{CE})

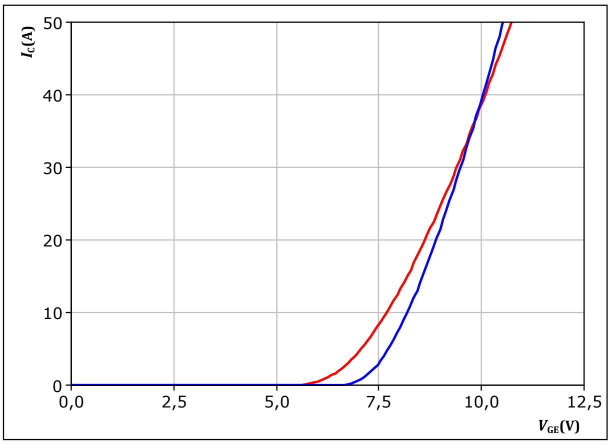


t_p = 250 µs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 10. IGBT

Typical transfer characteristics

I_C = f(V_{GE})

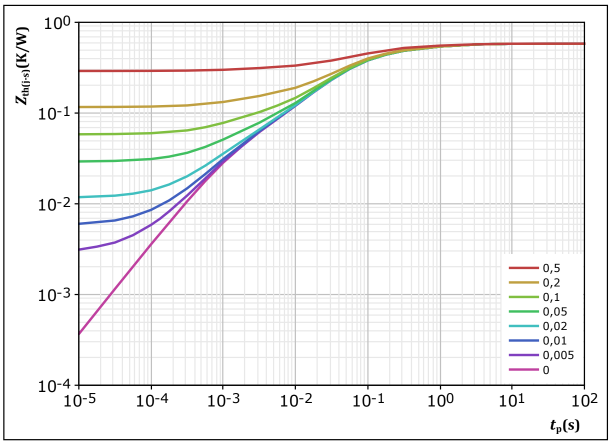


t_p = 250 µs
V_{CE} = 10 V
T_j: 25 °C, 150 °C

figure 11. IGBT

Transient thermal impedance as a function of pulse width

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



D = t_p / T
$R_{th(j-s)}$ = 0,582 K/W

IGBT thermal model values

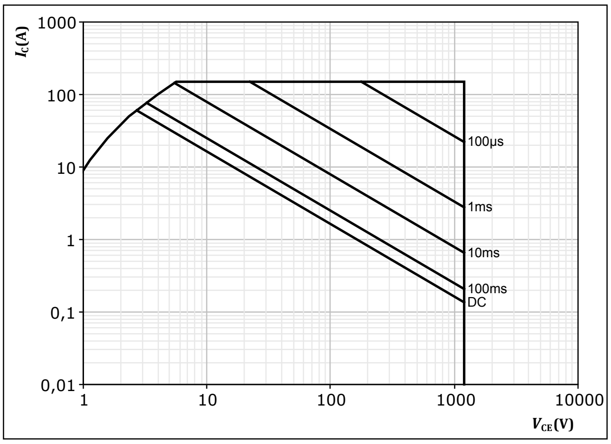
R (K/W)	τ (s)
4,21E-02	2,45E+00
1,10E-01	4,64E-01
3,06E-01	6,90E-02
9,13E-02	1,52E-02
3,27E-02	1,26E-03

Inverter Switch 2 Characteristics

figure 12. **IGBT**

Safe operating area

I_C = f(V_{CE})



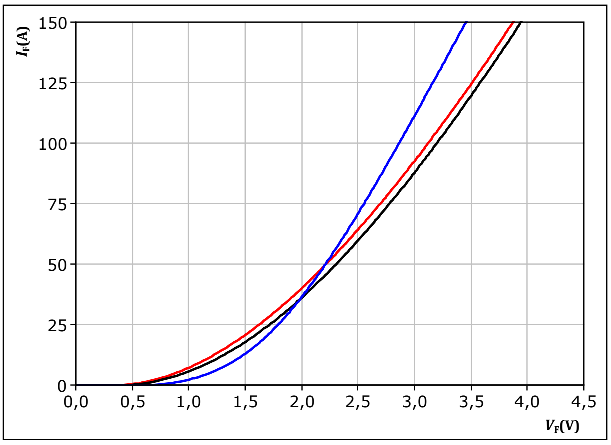
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

Inverter Diode 2 Characteristics

figure 13. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



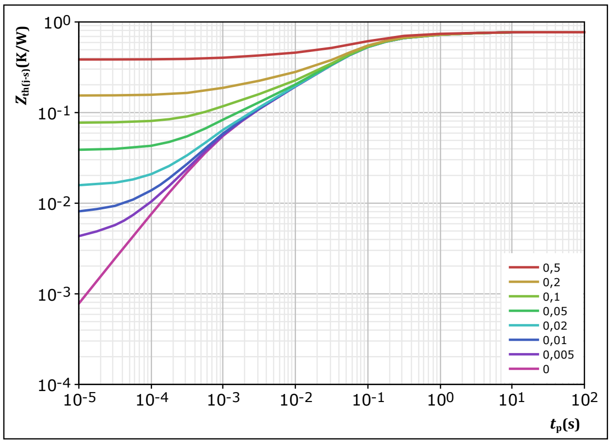
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 14. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,77 K/W

FWD thermal model values

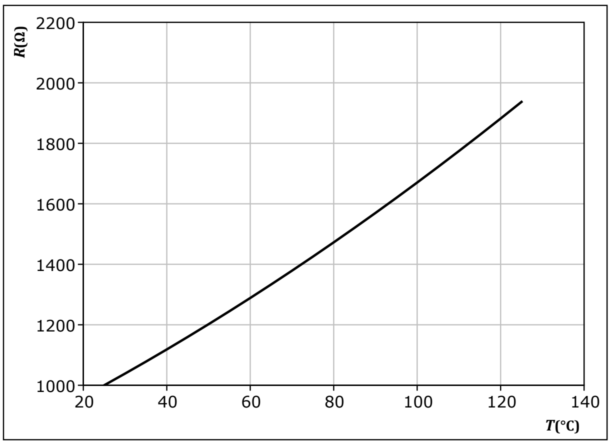
R (K/W)	τ (s)
6,81E-02	2,32E+00
1,41E-01	2,74E-01
4,03E-01	6,14E-02
1,01E-01	8,37E-03
5,84E-02	9,85E-04

Thermistor Characteristics

figure 15.	Thermistor

Typical PTC characteristic as function of temperature

R_T = f(T)

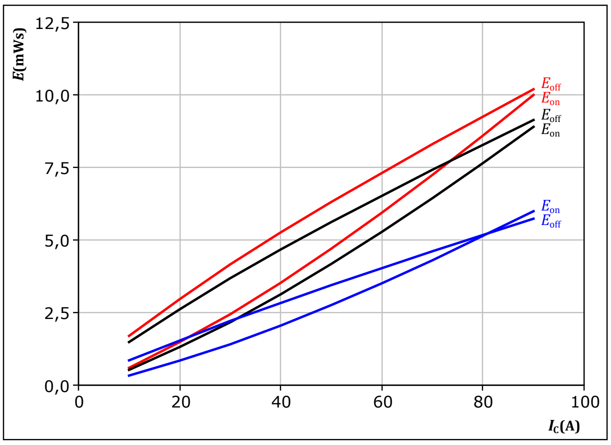


Inverter Switching Characteristics

figure 16. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



With an inductive load at

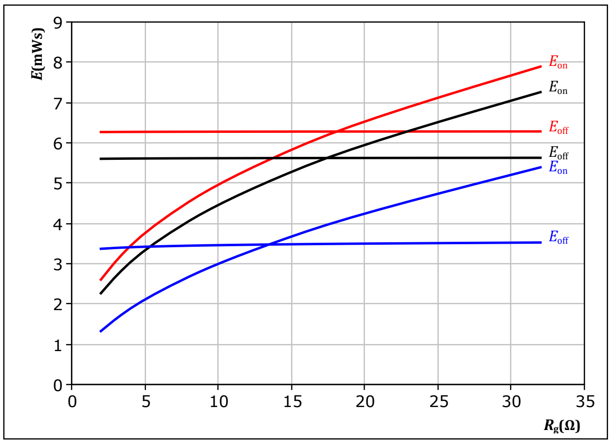
V_{CE} =	600	V	
V_{GE} =	±15	V	
R_{gon} =	8	Ω	
R_{goff} =	8	Ω	

T_j: 25 °C, 125 °C, 150 °C

figure 17. **IGBT**

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

$E = f(R_g)$



With an inductive load at

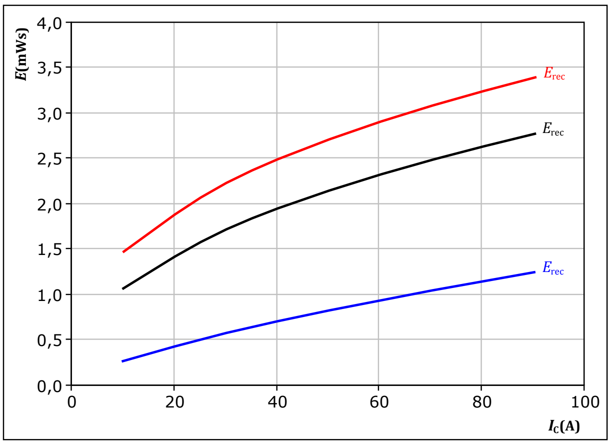
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	50	A

T_j: 25 °C, 125 °C, 150 °C

figure 18. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



With an inductive load at

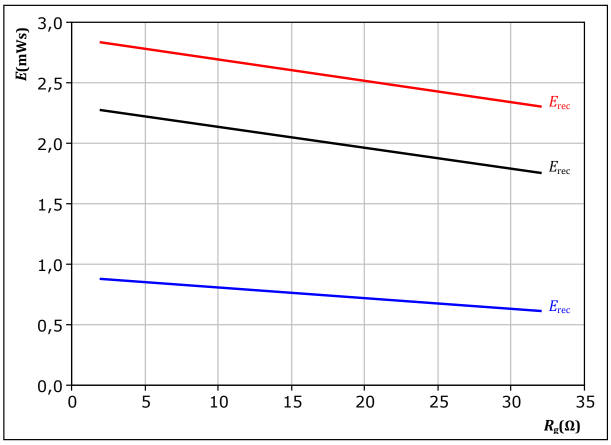
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	8	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 19. **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 =	50	A

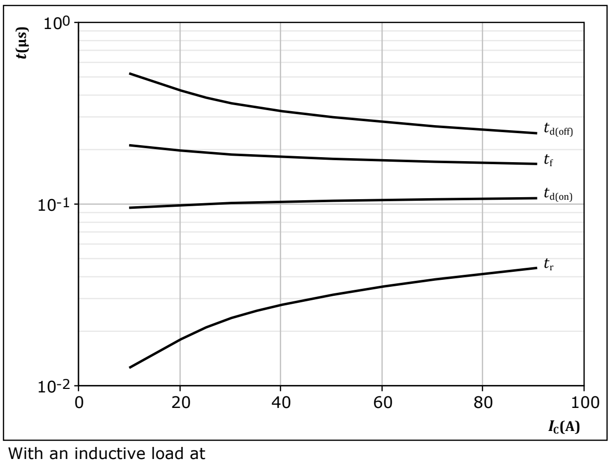
T_j: 25 °C, 125 °C, 150 °C

Inverter Switching Characteristics

figure 20. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



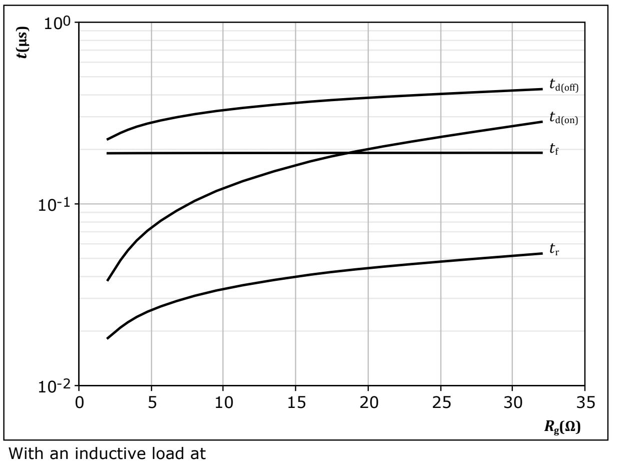
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

figure 21. **IGBT**

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

$t = f(R_g)$



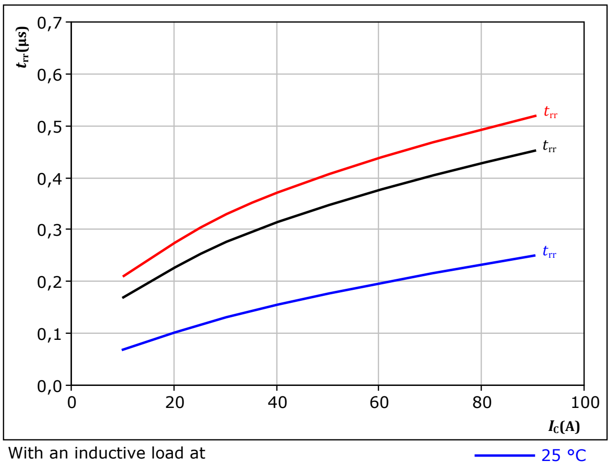
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	50	A

figure 22. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



With an inductive load at

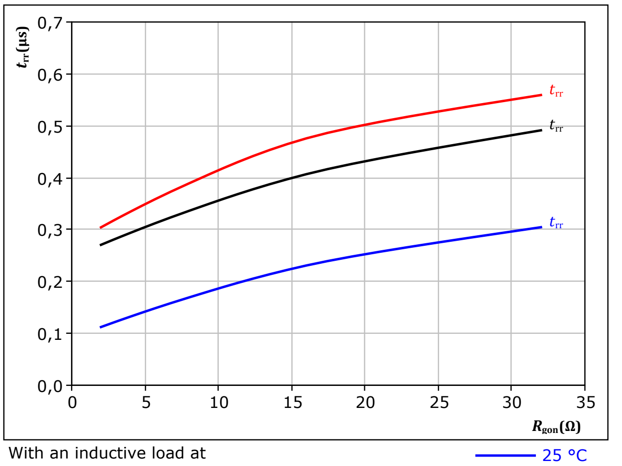
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	8	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 23. **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 =	50	A

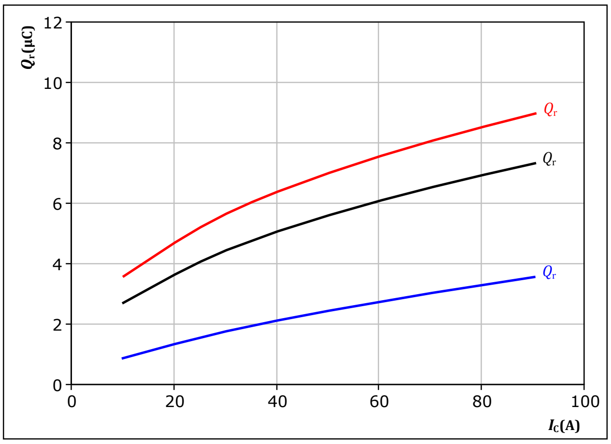
T_j: 25 °C, 125 °C, 150 °C

Inverter Switching Characteristics

figure 24. FWD

Typical recovered charge as a function of collector current

Q_r = f(I_C)



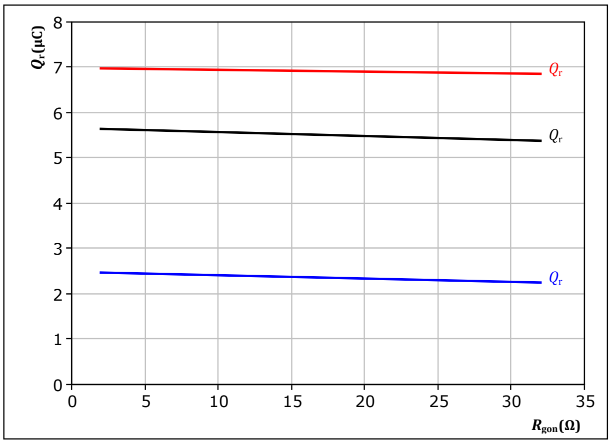
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	Ω		150 °C

figure 25. FWD

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

Q_r = f(R_{gon})



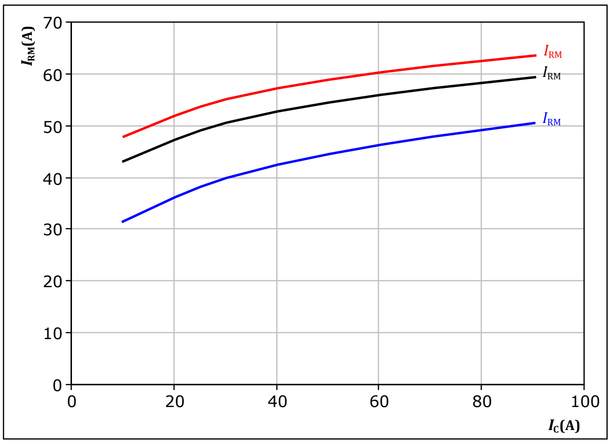
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	50	A		150 °C

figure 26. FWD

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



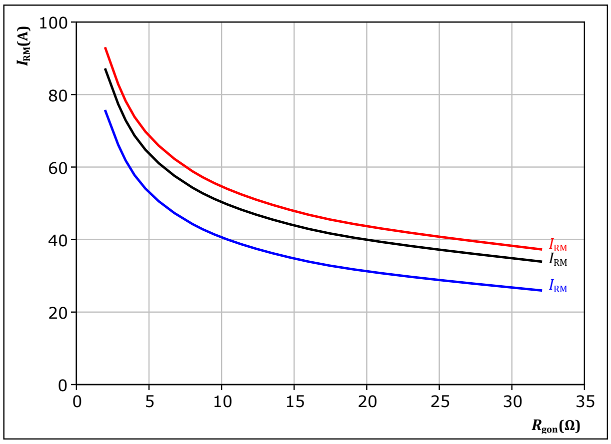
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	Ω		150 °C

figure 27. 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

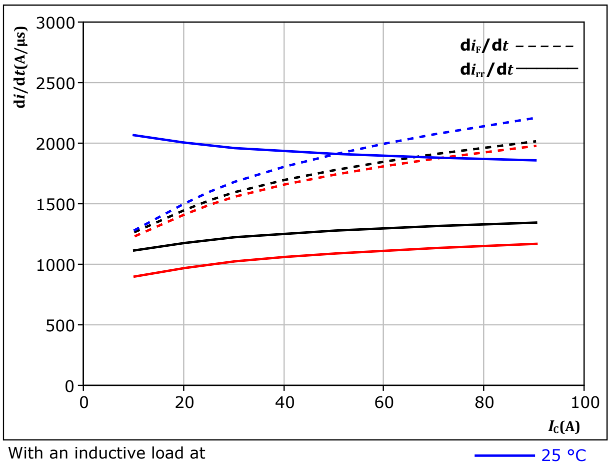
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	50	A		150 °C

Inverter Switching Characteristics

figure 28. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of collector current

$di_F/dt,\ di_{rr}/dt = f(I_C)$



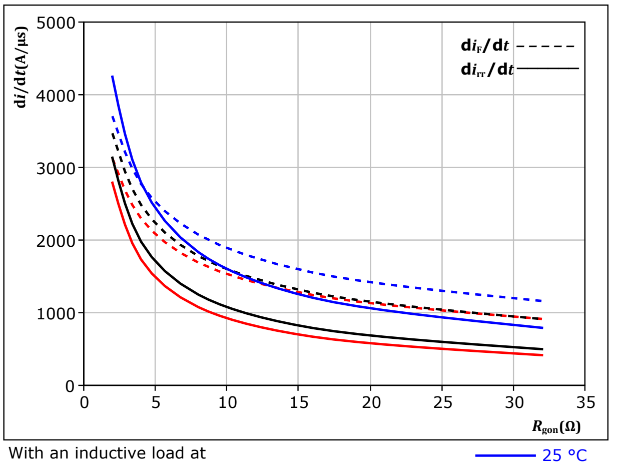
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	Ω		150 °C

figure 29. **FWD**

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

$di_F/dt,\ di_{rr}/dt = f(R_{gon})$



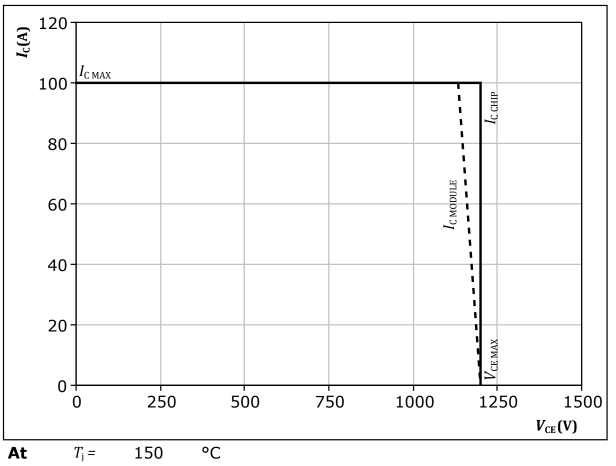
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	50	A		150 °C

figure 30. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



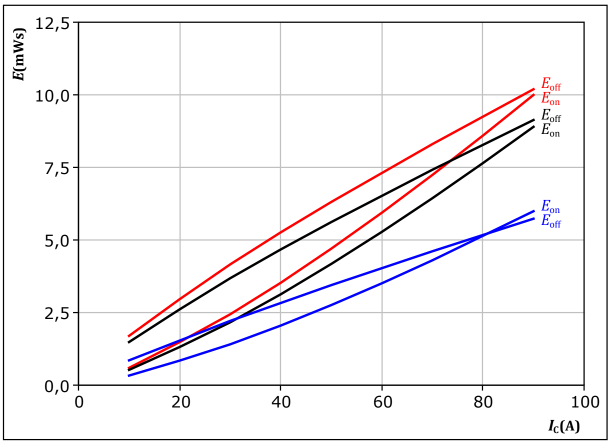
At	T_j =	150	°C
	R_{gon} =	8	Ω
	R_{goff} =	8	Ω

Inverter Switching Characteristics 2

figure 31. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



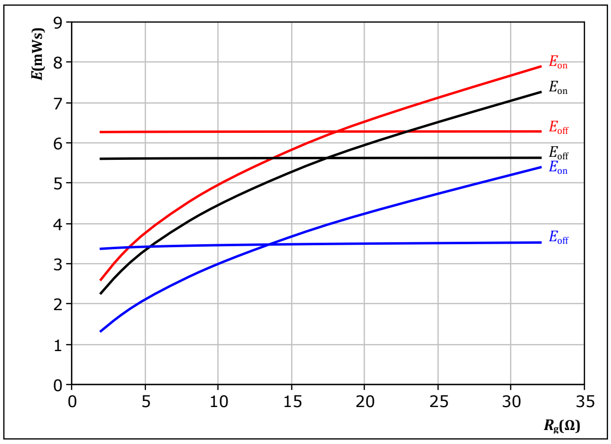
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	Ω		150 °C
R_{goff} =	8	Ω		

figure 32. **IGBT**

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

$E = f(R_g)$



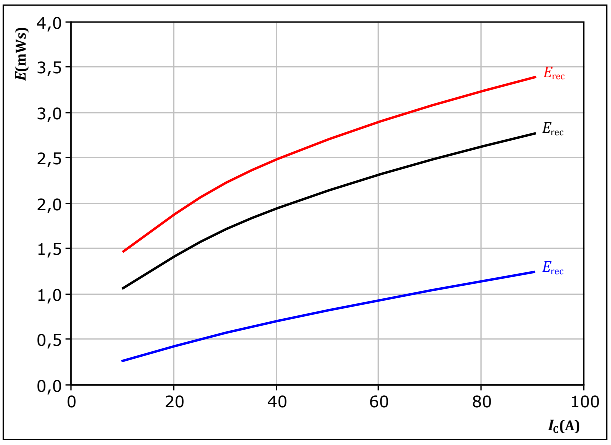
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	50	A		150 °C

figure 33. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



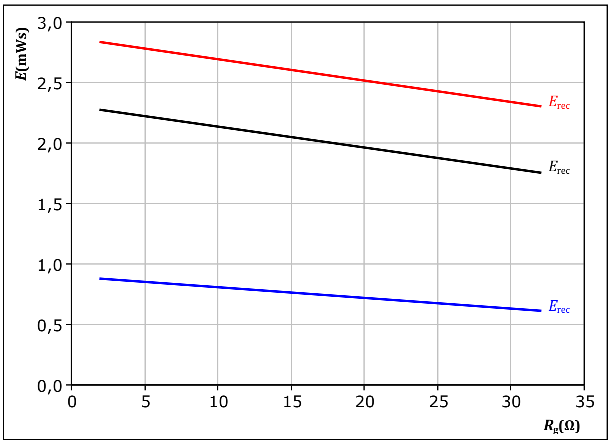
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	Ω		150 °C

figure 34. **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

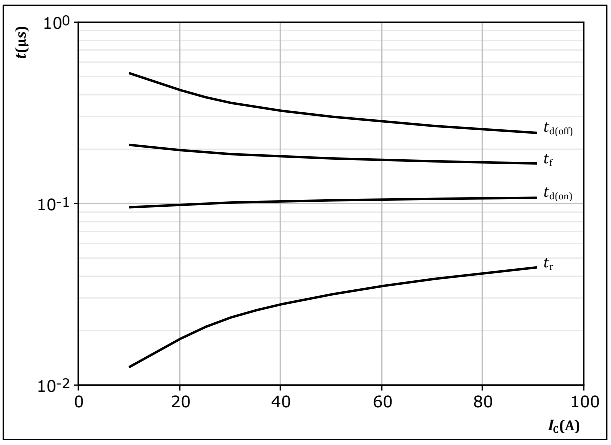
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	50	A		150 °C

Inverter Switching Characteristics 2

figure 35. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



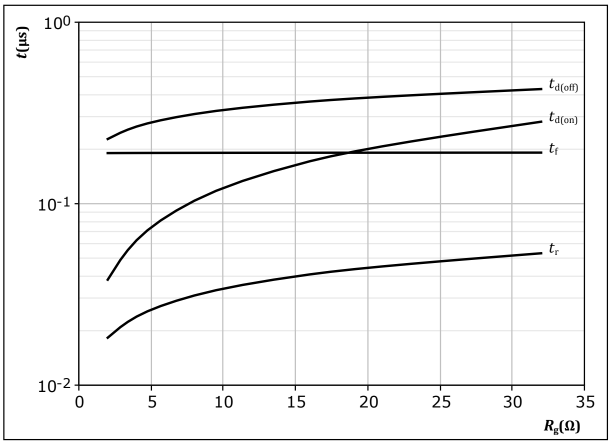
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

figure 36. **IGBT**

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

t = f(R_g)



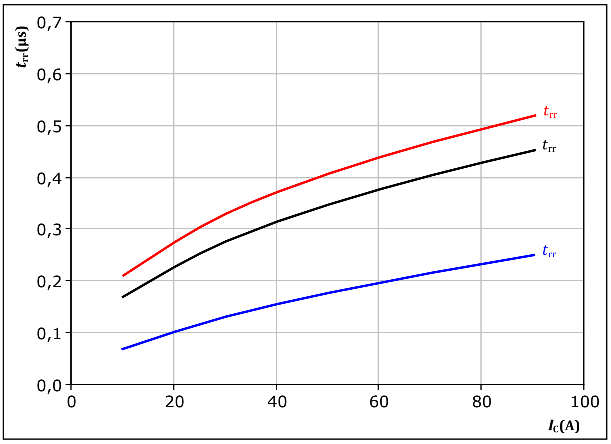
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	50	A

figure 37. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

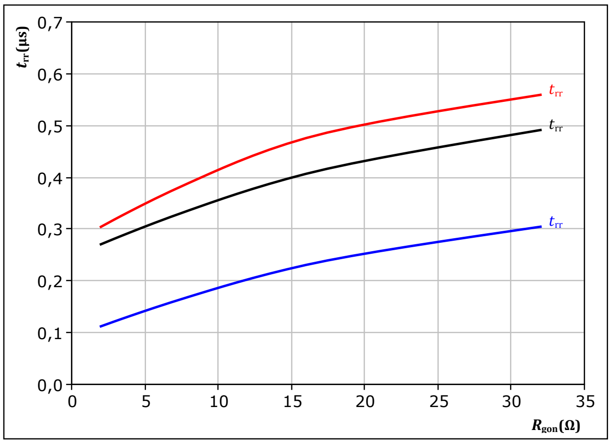
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	8	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 38. **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 =	50	A

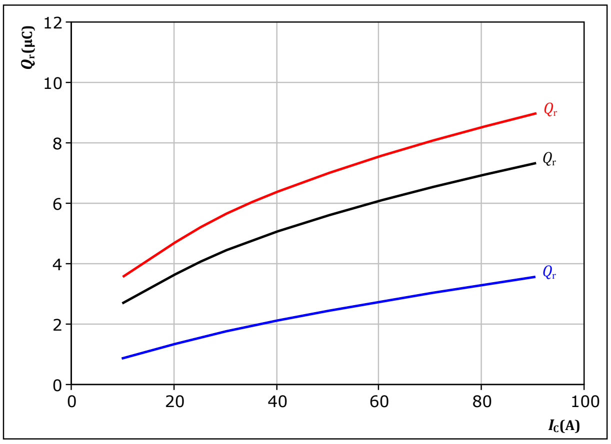
T_j: 25 °C, 125 °C, 150 °C

Inverter Switching Characteristics 2

figure 39. FWD

Typical recovered charge as a function of collector current

Q_r = f(I_C)



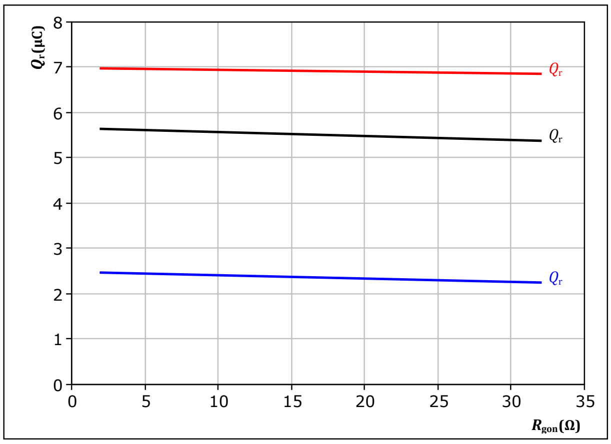
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	Ω		150 °C

figure 40. FWD

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

Q_r = f(R_{gon})



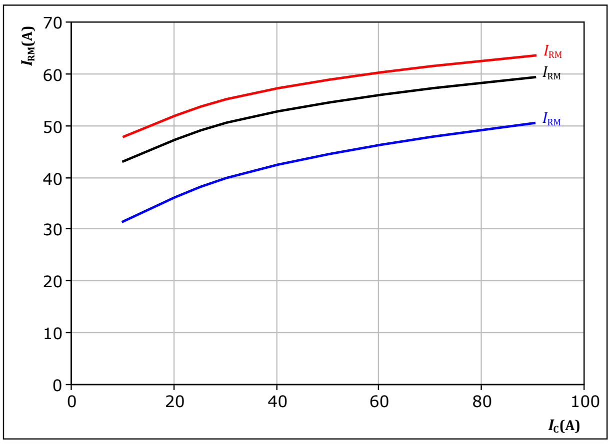
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	50	A		150 °C

figure 41. FWD

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



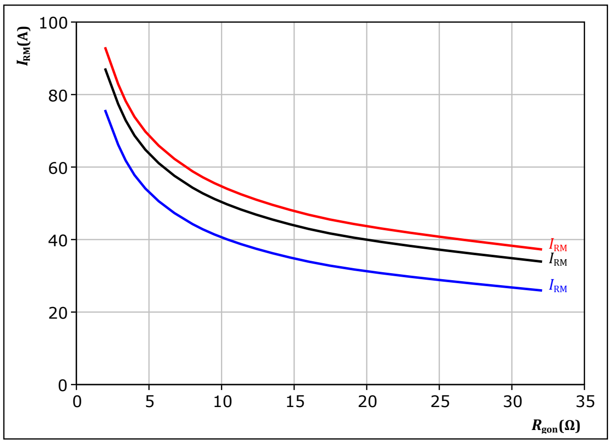
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	Ω		150 °C

figure 42. 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

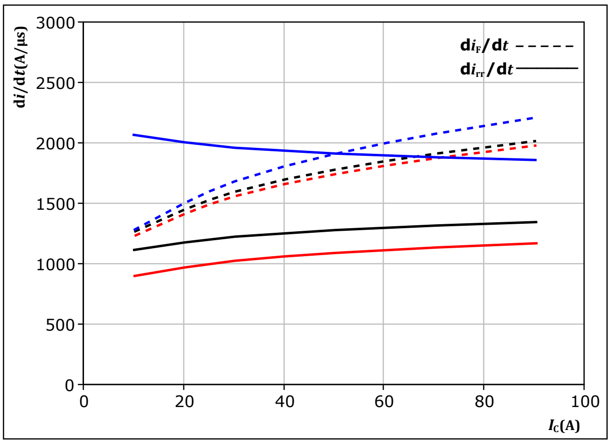
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	50	A		150 °C

Inverter Switching Characteristics 2

figure 43. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of collector current

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



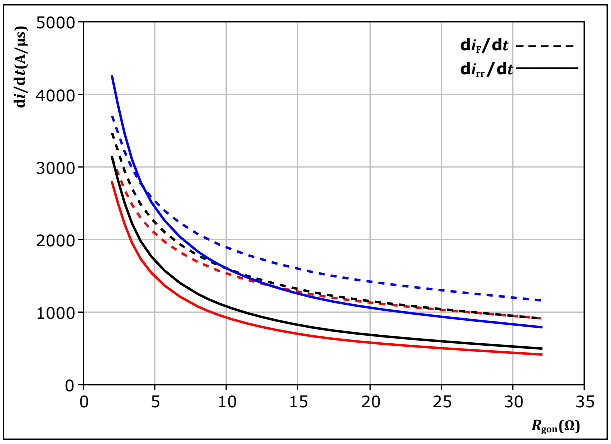
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	Ω		150 °C

figure 44. **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})



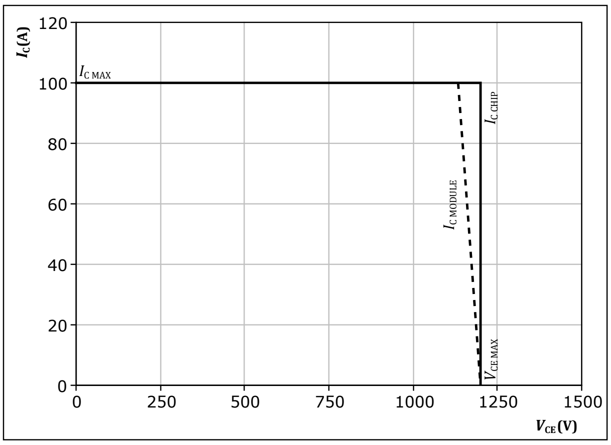
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	50	A		150 °C

figure 45. **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 46. **IGBT**

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

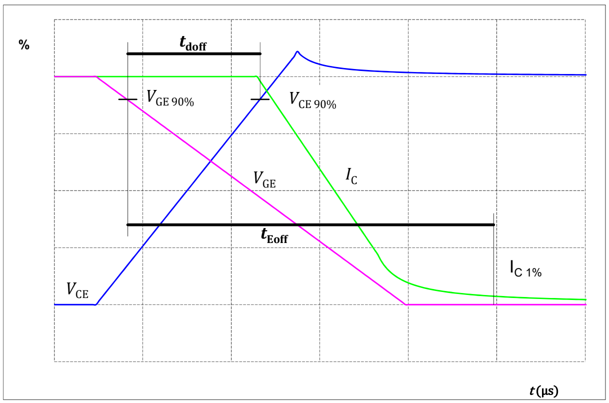


figure 47. **IGBT**

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

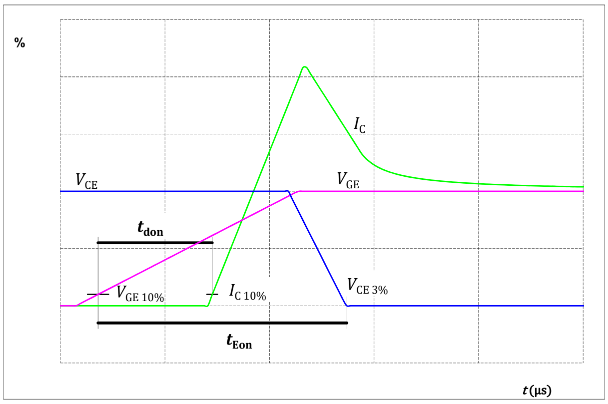


figure 48. **IGBT**

Turn-off Switching Waveforms & definition of t_f

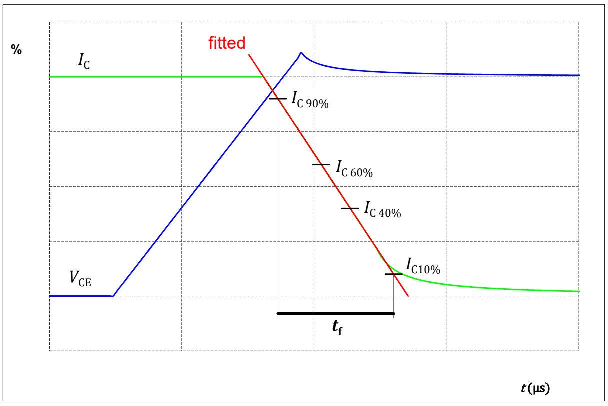
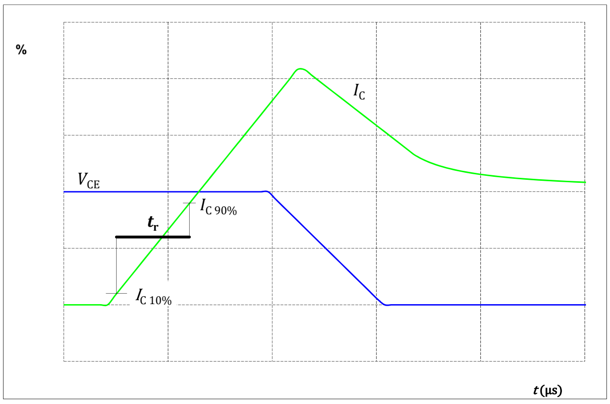


figure 49. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Switching Definitions

figure 50. **FWD**

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

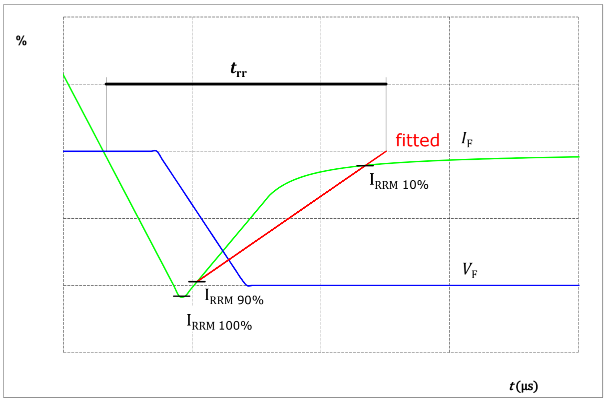
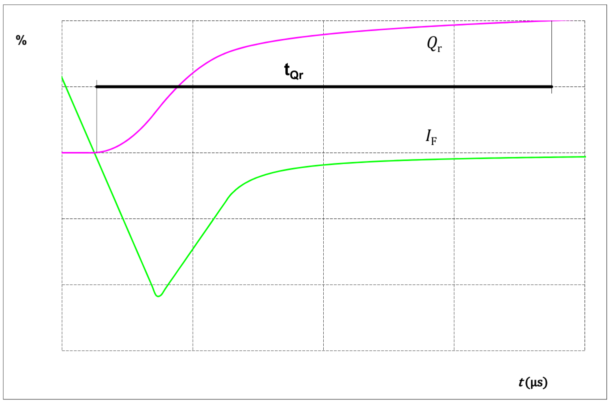


figure 51. **FWD**

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



Ordering Code

Version	Ordering Code
With std lid (6.5mm height) + no thermal grease	80-M312WPA050SC-K889F41-/0A/
With thin lid (2.8mm height) + no thermal grease	80-M312WPA050SC-K889F41-/0B/
With std lid (6.5mm height) + thermal grease (0,8 W/mK, P12, silicone-based)	80-M312WPA050SC-K889F41-/1A/
With thin lid (2.8mm height) + thermal grease (0,8 W/mK, P12, silicone-based)	80-M312WPA050SC-K889F41-/1B/
With std lid (6.5mm height) + thermal grease (2,5 W/mK, TG20032, silicone-free)	80-M312WPA050SC-K889F41-/4A/
With thin lid (2.8mm height) + thermal grease (2,5 W/mK, TG20032, silicone-free)	80-M312WPA050SC-K889F41-/4B/
With std lid (6.5mm height) + thermal grease (2,5 W/mK, HPTP, silicone-based)	80-M312WPA050SC-K889F41-/5A/
With thin lid (2.8mm height) + thermal grease (2,5 W/mK, HPTP, silicone-based)	80-M312WPA050SC-K889F41-/5B/

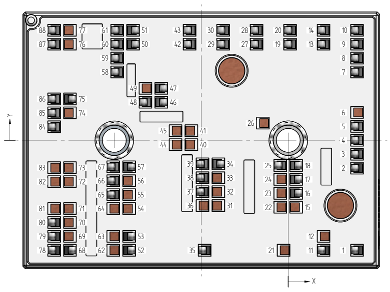
Marking

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

Outline

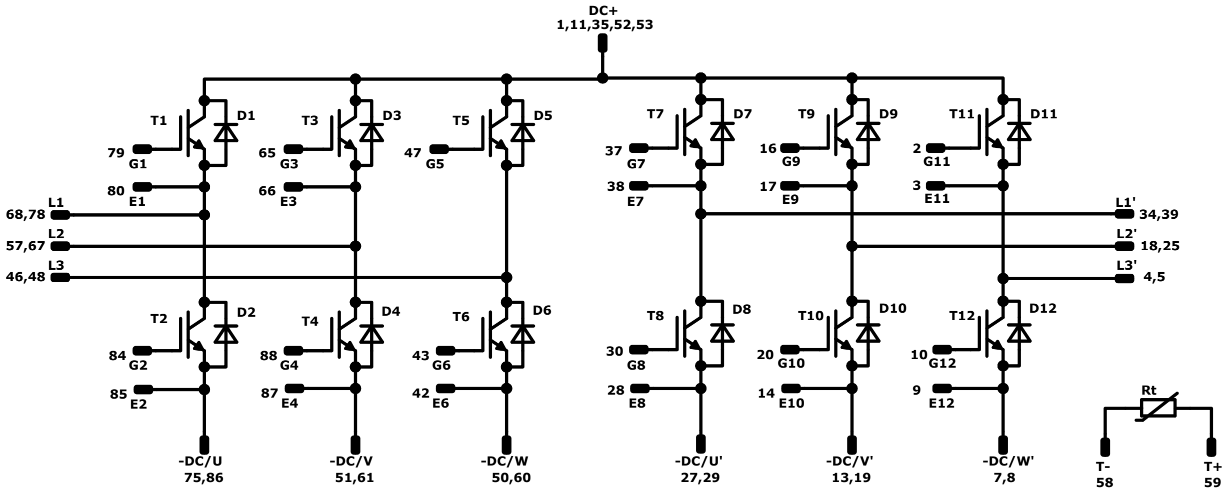
Pin table [mm]

Pin	X	Y	Function	Pin	X	Y	Function
1	15,83	-25,3	+DC	45	not assembled		
2	15,83	-6,4	G11	46	-29,18	8,74	L3
3	15,83	-3,2	E11	47	-29,18	11,94	G5
4	15,83	0	L3'	48	-32,82	8,74	L3
5	15,83	3,2	L3'	49	not assembled		
6	not assembled			50	-35,68	22,1	-DC/W
7	15,83	15,7	-DC/W'	51	-35,68	25,3	-DC/V
8	15,83	18,9	-DC/W'	52	-36,58	-25,3	+DC
9	15,83	22,1	E12	53	-36,58	-22,1	+DC
10	15,83	25,3	G12	54	not assembled		
11	8,13	-25,3	+DC	55	not assembled		
12	not assembled			56	not assembled		
13	8,13	22,1	-DC/V'	57	-36,58	-6,1	L2
14	8,13	25,3	E10	58	-39,32	15,7	T-
15	not assembled			59	-39,32	18,9	T+
16	1,82	-12,18	G9	60	-39,32	22,1	-DC/W
17	1,82	-8,98	E9	61	-39,32	25,3	-DC/V
18	1,82	-5,79	L2'	62	not assembled		
19	0,43	22,1	-DC/V'	63	not assembled		
20	0,43	25,3	G10	64	not assembled		
21	not assembled			65	-40,22	-12,5	G3
22	not assembled			66	-40,22	-9,3	E3
23	not assembled			67	-40,22	-6,09	L2
24	not assembled			68	-50,18	-25,3	L1
25	-1,82	-5,79	L2'	69	not assembled		
26	not assembled			70	not assembled		
27	-7,27	22,1	-DC/U'	71	not assembled		
28	-7,27	25,3	E8	72	not assembled		
29	-14,97	22,1	-DC/U'	73	not assembled		
30	-14,97	25,3	G8	74	not assembled		
31	not assembled			75	-50,18	9,5	-DC/U
32	not assembled			76	not assembled		
33	not assembled			77	not assembled		
34	-16,05	-5,42	L1'	78	-53,82	-25,3	L1
35	-19,22	-25,3	+DC	79	-53,82	-22,1	G1
36	not assembled			80	-53,82	-18,9	E1
37	-19,7	-11,82	G7	81	not assembled		
38	-19,7	-8,62	E7	82	not assembled		
39	-19,7	-5,42	L1'	83	not assembled		
40	not assembled			84	-53,82	3,1	G2
41	not assembled			85	-53,82	6,3	E2
42	-22,67	22,1	E6	86	-53,82	9,5	-DC/U
43	-22,67	25,3	G6	87	-53,82	22,1	E4
44	not assembled			88	-53,82	25,3	G4



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

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T2, T1, T4, T3, T6, T5	IGBT	1200 V	50 A	Inverter Switch	
D1, D2, D3, D4, D5, D6	FWD	1200 V	50 A	Inverter Diode	
T8, T7, T10, T9, T12, T11	IGBT	1200 V	50 A	Inverter Switch 2	
D7, D8, D9, D10, D11, D12	FWD	1200 V	50 A	Inverter Diode 2	
Rt	Thermistor			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 48	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for MiniSKiiP® 3 packages see vincotech.com website.

Package data
Package data for MiniSKiiP® 3 packages see vincotech.com website.

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

UL recognition and file number
This device is certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
80-M312WPA050SC-K889F41-D1-14	20 Jan. 2023		