



Vincotech

80-M212WPA050M7-K750F70

datasheet

MiniSKiiP® PACK 2

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
- Switching optimized for EMC

Housing features

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

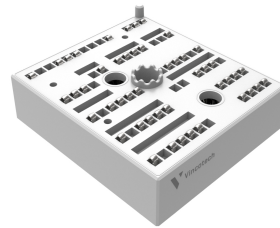
Target applications

- Embedded Drives
- Industrial Drives

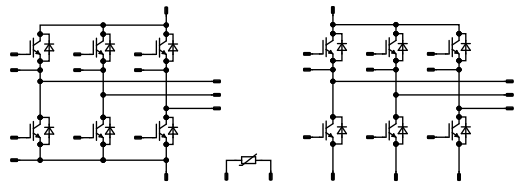
Types

- 80-M212WPA050M7-K750F70

MiniSKiiP® 2 16 mm housing



Schematic





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Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Inverter Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	26	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	30	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	79	W
Gate-emitter voltage	V_{GES}		± 20	V
Short circuit ratings	t_{SC}	$V_{GE} = 15\text{ V}$, $V_{CC} = 800\text{ V}$ $T_j = 150\text{ °C}$	9,5	μs
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$

Inverter Diode

Peak repetitive reverse voltage	V_{RRM}		1600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	43	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, $t_p = 10\text{ ms}$ $T_j = 150\text{ °C}$	200	A
Surge current capability	I^2t		200	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	58	W
Maximum junction temperature	T_{jmax}		150	$^{\circ}\text{C}$

Inverter Switch 2

Collector-emitter voltage	V_{CES}		1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	68	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	100	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	151	W
Gate-emitter voltage	V_{GES}		± 20	V
Short circuit ratings	t_{SC}	$V_{GE} = 15\text{ V}$, $V_{CC} = 800\text{ V}$ $T_j = 150\text{ °C}$	9,5	μs
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$



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Maximum Ratings

$T_j = 25\text{ °C}$, 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	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	55	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	100	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	105	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* $t_p = 2\text{ s}$	5500	V
Isolation voltage	V_{isol}	AC Voltage $t_p = 1\text{ min}$	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



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Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	

Inverter Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$			10	0,0015	25	5,4	6	6,6	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		15	25 125 150		1,7 1,95 2,01	2,1 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			60	µA
Gate-emitter leakage current	I_{GES}		0	0		25			200	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	0	10		25			2900		pF
Output capacitance	C_{oes}							120		pF
Reverse transfer capacitance	C_{res}							34		pF
Gate charge	Q_g	$V_{CC} = 600$ V	0/15		15	25		110		nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 2,5$ W/mK (HPTP)						1,2		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 32$ Ω $R_{goff} = 32$ Ω	±15	600	15	25 125		184,8 181		ns
Rise time	t_r					25 125		35,2 42		ns
Turn-off delay time	$t_{d(off)}$					25 125		180,2 203		ns
Fall time	t_f					25 125		85,46 110,53		ns
Turn-on energy (per pulse)	E_{on}	$Q_{iFWD}=35,89$ µC $Q_{iFWD}=39,16$ µC				25 125		18,25 21,27		mWs
Turn-off energy (per pulse)	E_{off}					25 125		1,01 1,38		mWs



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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				18	25 125 150		1,11 1,03 1,02	1,5 ⁽¹⁾	V
Reverse leakage current	I_R	$V_i = 1600$ V				25 150			100 1000	µA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 2,5$ W/mK (HPTP)						1,2		K/W
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Dynamic

Peak recovery current	I_{RRM}	$di/dt=413$ A/µs $di/dt=332$ A/µs	± 15	600	15	25 125		48,41 41,29		A
Reverse recovery time	t_{rr}					25 125		1587 1931		ns
Recovered charge	Q_r					25 125		35,89 39,16		µC
Reverse recovered energy	E_{rec}					25 125		8,6 8,91		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125		113,02 76,45		A/µs



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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	$V_{GE(th)}$			10	0,005	25	5,4	6	6,6	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		50	25 125 150		1,55 1,77 1,83	1,9 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			0,09	mA
Gate-emitter leakage current	I_{GES}		20	0		25			0,5	μA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	0	10	25				10000		pF
Output capacitance	C_{oes}							350		pF
Reverse transfer capacitance	C_{res}							130		pF
Gate charge	Q_g	$V_{CC} = 600$ V	0/15		50	25		380		nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 2,5$ W/mK (HPTP)						0,63		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 8 \Omega$ $R_{goff} = 8 \Omega$	± 15	600	50	25 125 150		176 176 190		ns
Rise time	t_r					25 125 150		52 58 60		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		206 229 241		ns
Fall time	t_f					25 125 150		92,14 124,72 122,14		ns
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD}=4,93 \mu C$ $Q_{tFWD}=7,08 \mu C$ $Q_{tFWD}=8,04 \mu C$				25 125 150		4,82 6,38 6,25		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		2,98 4,25 5,03		mWs



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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		1,66 1,78 1,79	2,1 ⁽¹⁾	V
Reverse leakage current	I_R	$V_i = 1200$ V				25			40	µA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 2,5$ W/mK (HPTP)						0,91		K/W
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Dynamic

Peak recovery current	I_{RRM}	$di/dt=338$ A/µs $di/dt=450$ A/µs $di/dt=498$ A/µs	± 15	600	50	25 125 150		28,72 32,83 32,97		A
Reverse recovery time	t_{rr}					25 125 150		339,05 434,87 511,31		ns
Recovered charge	Q_r					25 125 150		4,93 7,08 8,04		µC
Reverse recovered energy	E_{rec}					25 125 150		1,79 2,59 3,33		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		194,94 128,35 114,47		A/µs



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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		5		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	$R_{100} = 499 \Omega$				100	3,2		3,3	%
Power dissipation	P					25		130		mW
Power dissipation constant	d					25		1,3		mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 1 \%$						3380		K
Vincotech Thermistor Reference									V	

⁽¹⁾ Value at chip level

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



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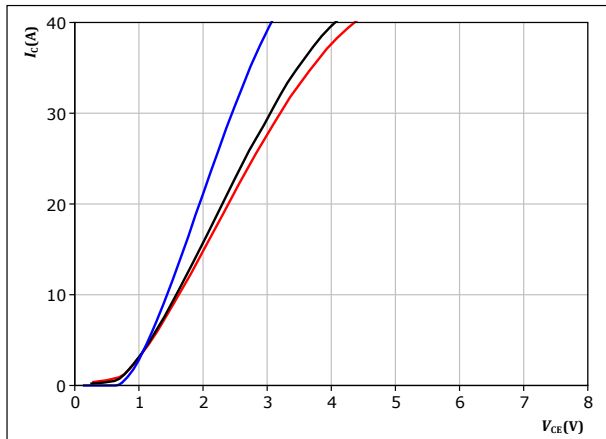
datasheet

Inverter Switch Characteristics

figure 1. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$

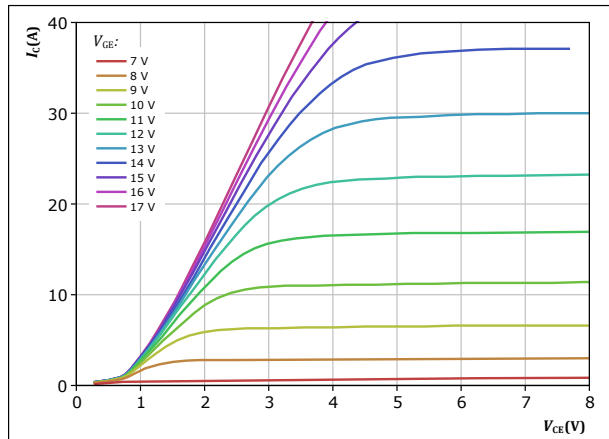


$t_p = 250 \mu s$
 $V_{GE} = 15 V$
 $T_j:$ 25 °C, 125 °C, 150 °C

figure 2. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$

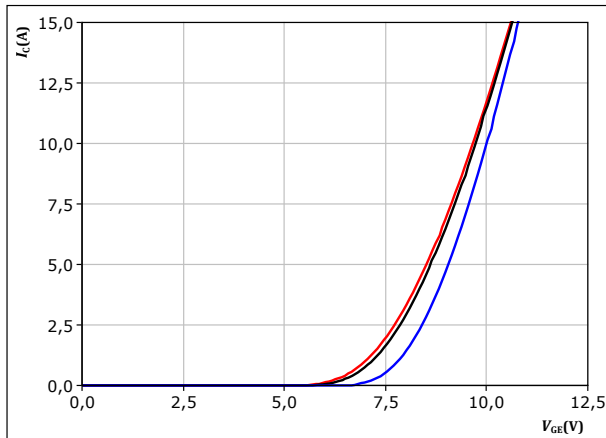


$t_p = 250 \mu s$
 $T_j = 150 ^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

$$I_C = f(V_{GE})$$

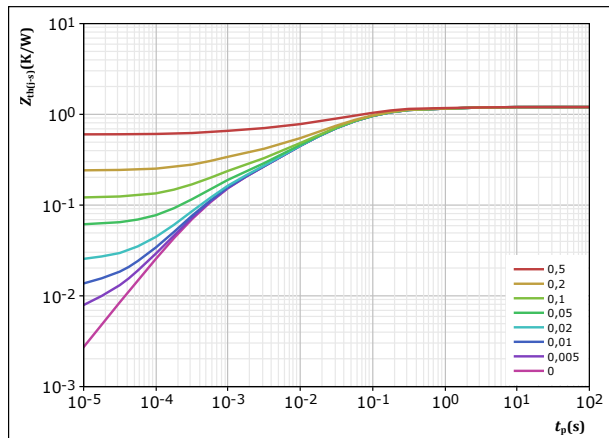


$t_p = 250 \mu s$
 $V_{CE} = 10 V$
 $T_j:$ 25 °C, 125 °C, 150 °C

figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 1,203 K/W$
IGBT thermal model values

$R (K/W)$	$\tau (s)$
8,45E-02	1,63E+00
4,66E-01	9,37E-02
3,90E-01	2,02E-02
1,45E-01	3,96E-03
1,16E-01	5,44E-04



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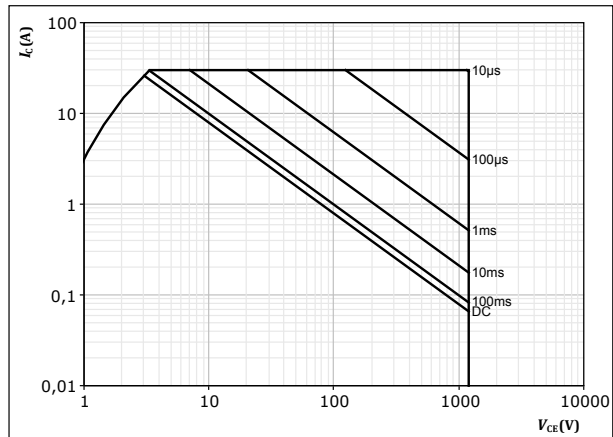
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Inverter Switch Characteristics

figure 5. IGBT

Safe operating area

$$I_C = f(V_{CE})$$

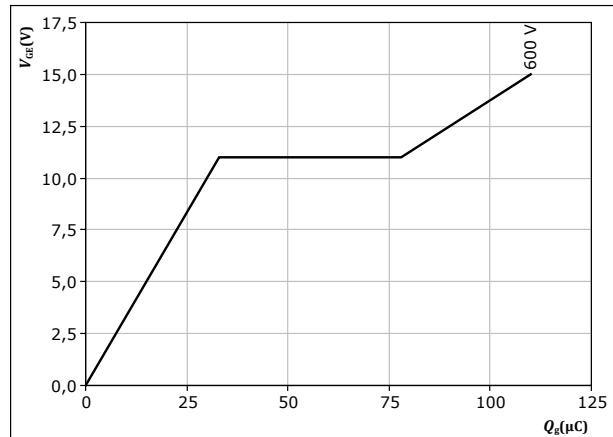


$D =$ single pulse
 $T_s = 80$ °C
 $V_{GE} = 15$ V
 $T_j = T_{jmax}$

figure 6. IGBT

Gate voltage vs gate charge

$$V_{GE} = f(Q_g)$$



$I_C = 15$ A
 $T_j = 25$ °C



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Inverter Diode Characteristics

figure 7.

Rectifier

Typical forward characteristics

$$I_F = f(V_F)$$

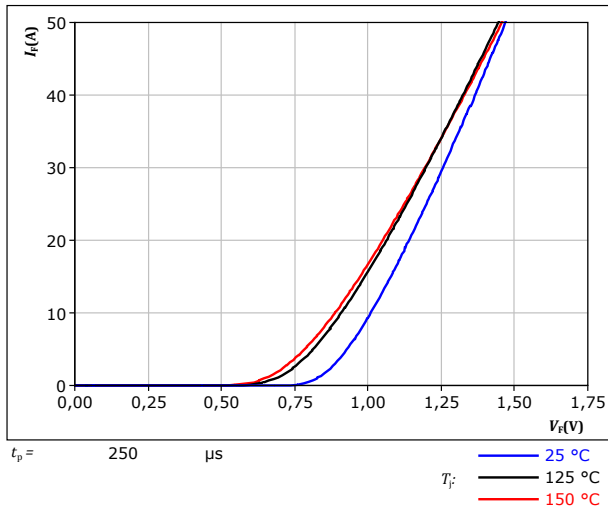
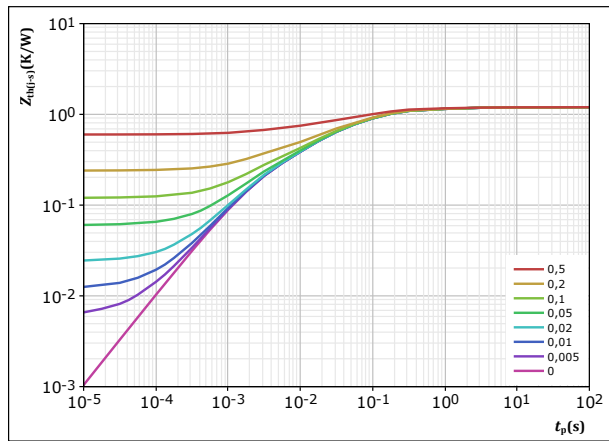


figure 8.

Rectifier

Transient thermal impedance as a function of pulse width

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





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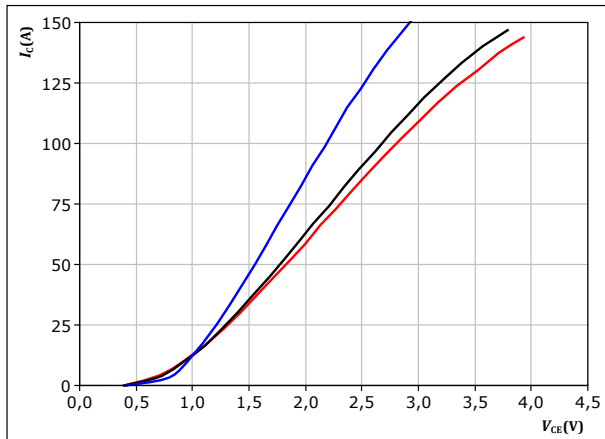
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Inverter Switch 2 Characteristics

figure 9. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$

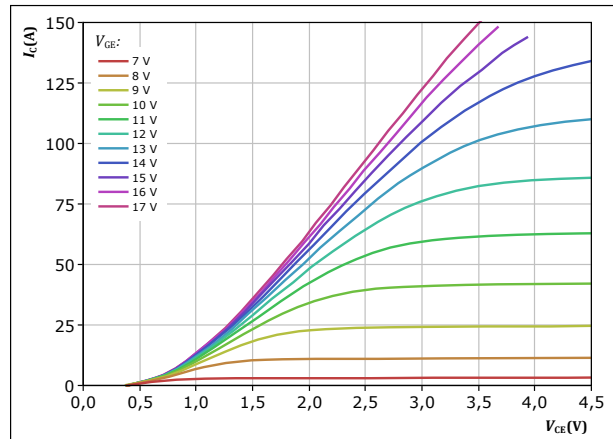


$t_p = 250 \mu s$
 $V_{GE} = 15 V$
 $T_j:$ 25 °C, 125 °C, 150 °C

figure 10. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$

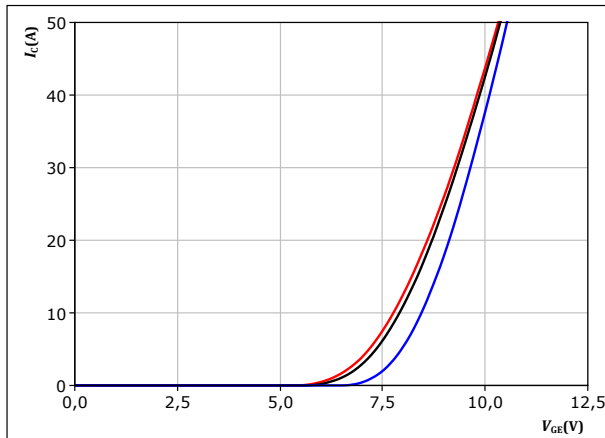


$t_p = 250 \mu s$
 $T_j = 150 \text{ °C}$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 11. IGBT

Typical transfer characteristics

$$I_C = f(V_{GE})$$

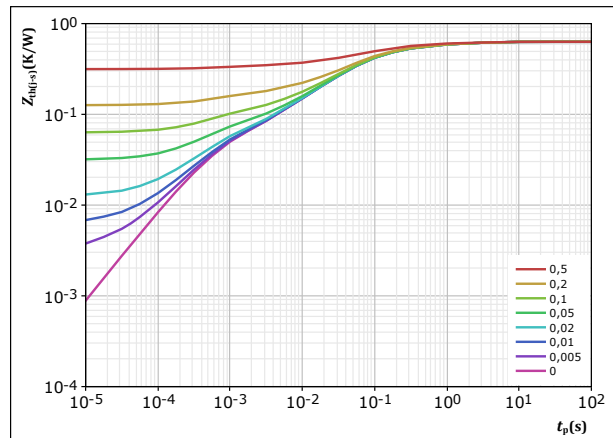


$t_p = 250 \mu s$
 $V_{CE} = 10 V$
 $T_j:$ 25 °C, 125 °C, 150 °C

figure 12. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0.63 \text{ K/W}$
IGBT thermal model values

$R \text{ (K/W)}$	$\tau \text{ (s)}$
5.38E-02	2.36E+00
1.33E-01	3.13E-01
3.14E-01	6.13E-02
8.40E-02	1.01E-02
4.51E-02	6.01E-04



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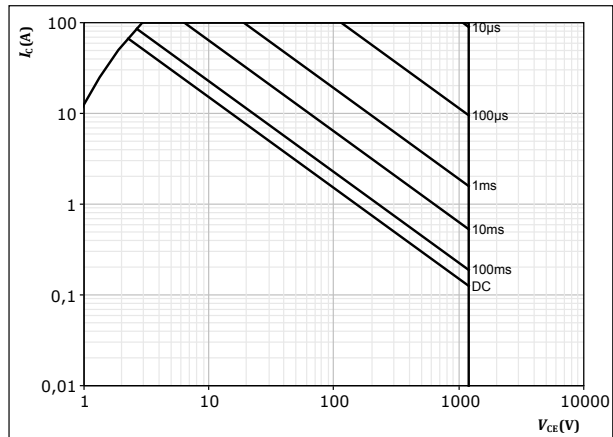
Inverter Switch 2 Characteristics

figure 13.

IGBT

Safe operating area

$$I_C = f(V_{CE})$$



$D = \text{single pulse}$

$T_s = 80 \text{ } ^\circ\text{C}$

$V_{GE} = 15 \text{ V}$

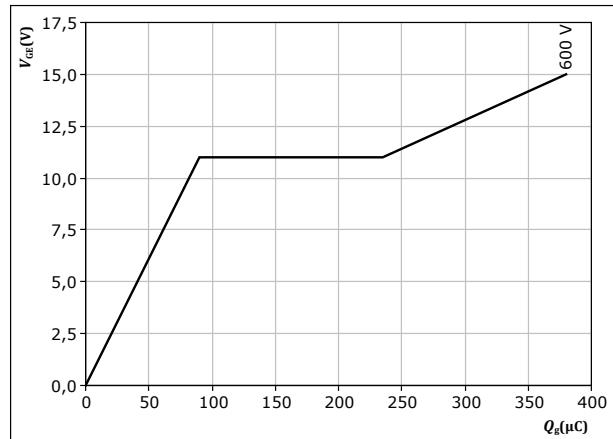
$T_j = T_{jmax}$

figure 14.

IGBT

Gate voltage vs gate charge

$$V_{GE} = f(Q_g)$$



$I_C = 50 \text{ A}$

$T_j = 25 \text{ } ^\circ\text{C}$



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Inverter Diode 2 Characteristics

figure 15.

FWD

Typical forward characteristics

$$I_F = f(V_F)$$

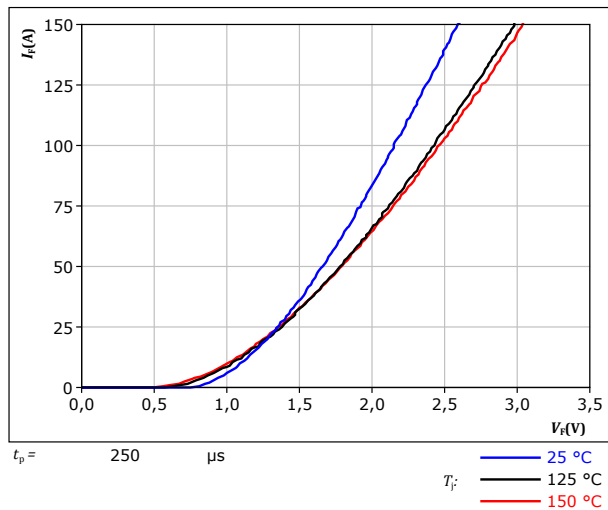
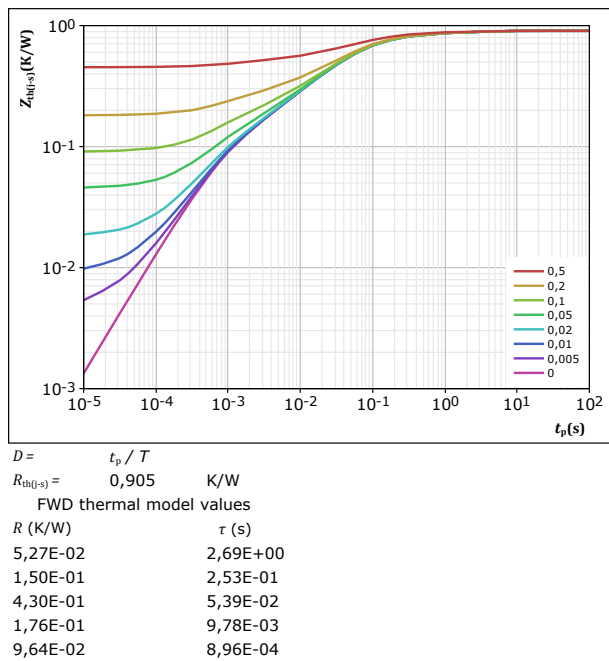


figure 16.

FWD

Transient thermal impedance as a function of pulse width

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





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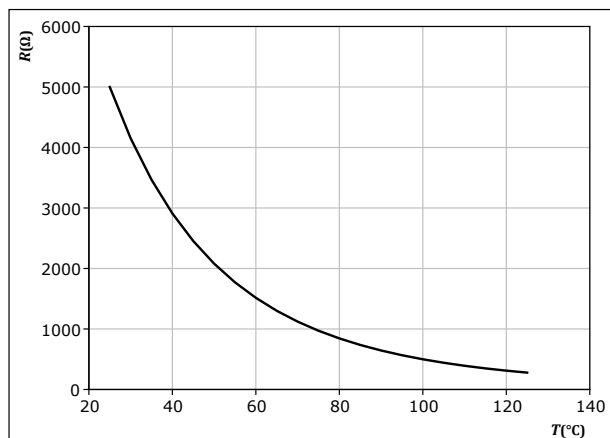
Thermistor Characteristics

figure 17.

Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$





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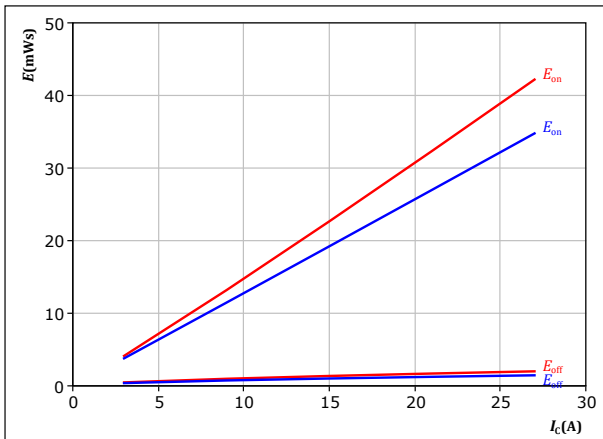
Inverter Switching Characteristics

figure 18.

IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_C)$$



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 32$ Ω
 $R_{goff} = 32$ Ω

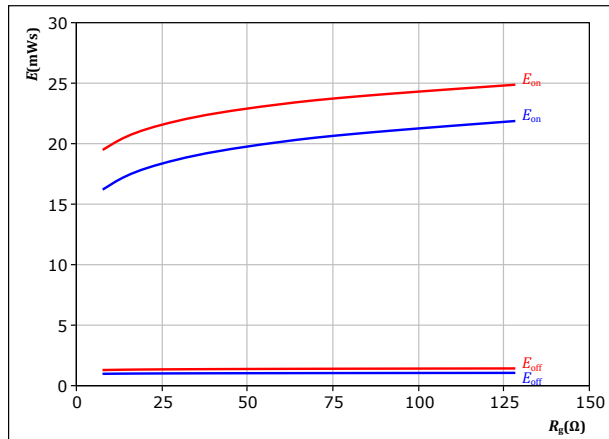
T_j : — 25 °C
— 125 °C

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

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 15$ A

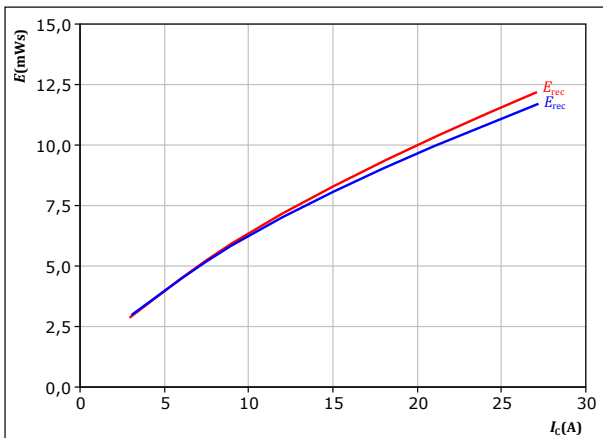
T_j : — 25 °C
— 125 °C

figure 20.

Rectifier

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
 $V_{GE} = \pm 15$ V
 $R_{gon} = 32$ Ω

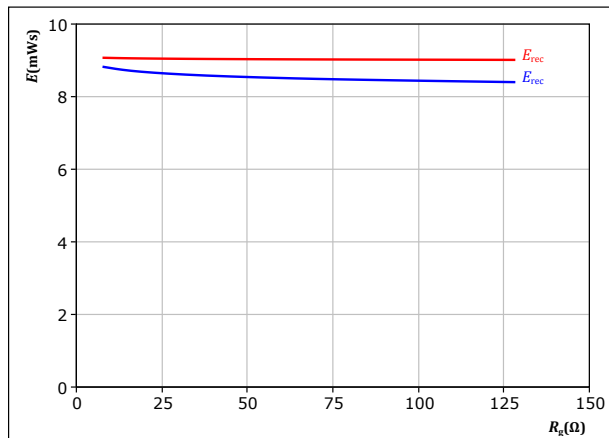
T_j : — 25 °C
— 125 °C

figure 21.

Rectifier

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
 $V_{GE} = \pm 15$ V
 $I_C = 15$ A

T_j : — 25 °C
— 125 °C



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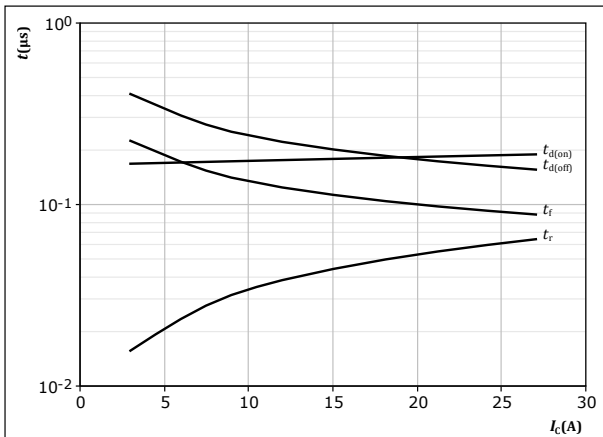
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Inverter Switching Characteristics

figure 22.

IGBT

Typical switching times as a function of collector current
 $t = f(I_C)$

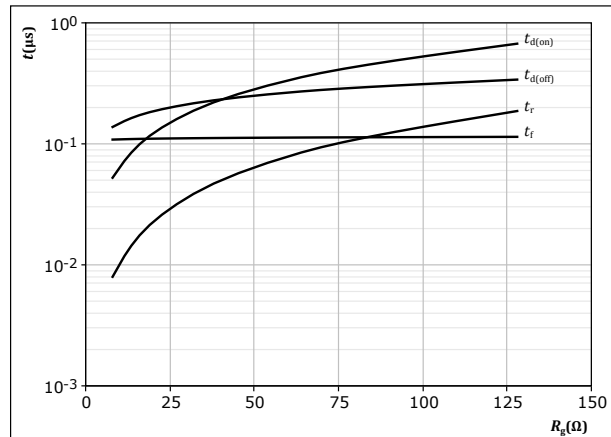


With an inductive load at
 $T_j = 125$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 32$ Ω
 $R_{goff} = 32$ Ω

figure 23.

IGBT

Typical switching times as a function of IGBT turn on gate resistor
 $t = f(R_g)$

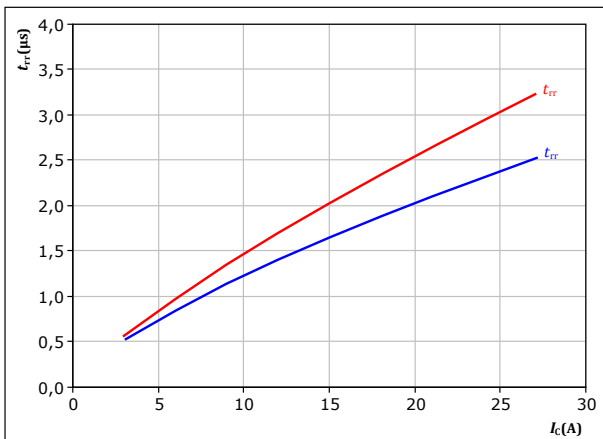


With an inductive load at
 $T_j = 125$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 15$ A

figure 24.

Rectifier

Typical reverse recovery time as a function of collector current
 $t_{rr} = f(I_C)$

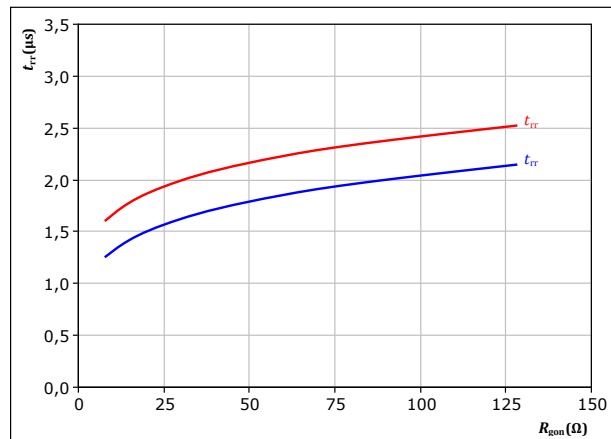


With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 32$ Ω
 T_j : — 25 °C
— 125 °C

figure 25.

Rectifier

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
 $V_{GE} = \pm 15$ V
 $I_C = 15$ A
 T_j : — 25 °C
— 125 °C



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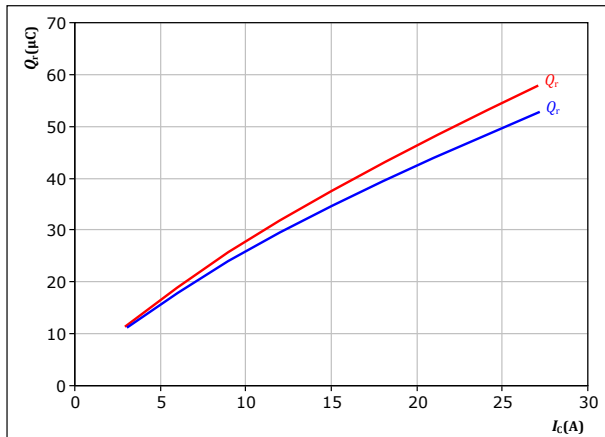
Inverter Switching Characteristics

figure 26.

Rectifier

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

$$\begin{aligned} V_{CE} &= 600 \text{ V} \\ V_{GE} &= \pm 15 \text{ V} \\ R_{gon} &= 32 \text{ } \Omega \end{aligned}$$

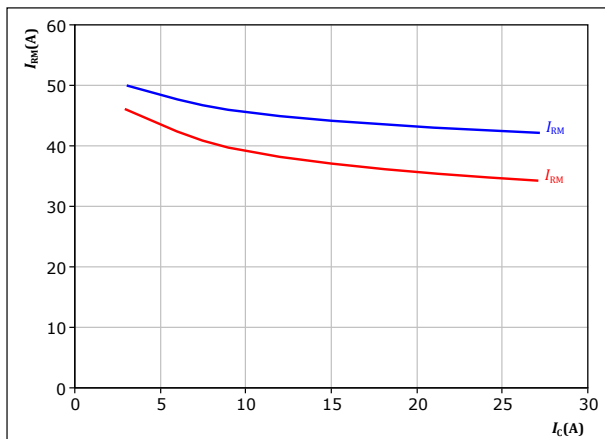
T_j : — 25 °C
— 125 °C

figure 28.

Rectifier

Typical peak reverse recovery current as a function of collector current

$$I_{RM} = f(I_c)$$



With an inductive load at

$$\begin{aligned} V_{CE} &= 600 \text{ V} \\ V_{GE} &= \pm 15 \text{ V} \\ R_{gon} &= 32 \text{ } \Omega \end{aligned}$$

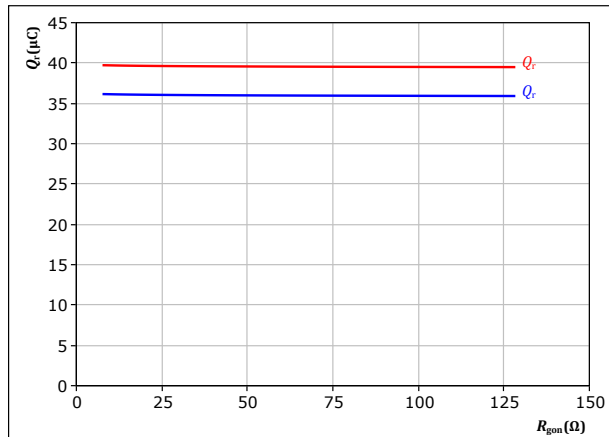
T_j : — 25 °C
— 125 °C

figure 27.

Rectifier

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

$$Q_r = f(R_{gon})$$



With an inductive load at

$$\begin{aligned} V_{CE} &= 600 \text{ V} \\ V_{GE} &= \pm 15 \text{ V} \\ I_c &= 15 \text{ A} \end{aligned}$$

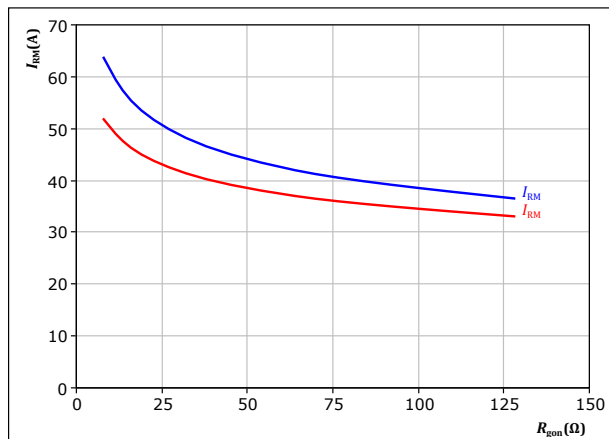
T_j : — 25 °C
— 125 °C

figure 29.

Rectifier

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

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



With an inductive load at

$$\begin{aligned} V_{CE} &= 600 \text{ V} \\ V_{GE} &= \pm 15 \text{ V} \\ I_c &= 15 \text{ A} \end{aligned}$$

T_j : — 25 °C
— 125 °C



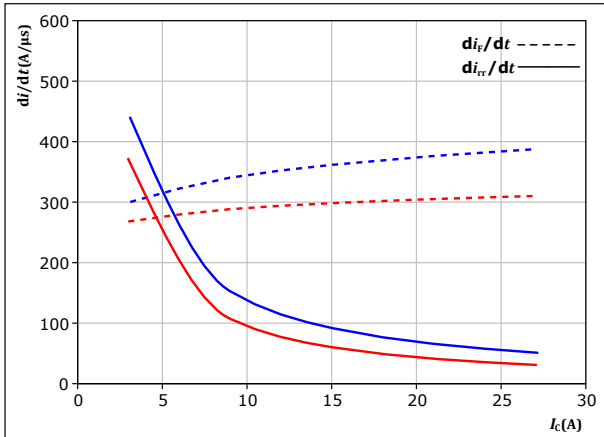
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datasheet

Inverter Switching Characteristics

figure 30. Rectifier

Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_r/dt = f(I_C)$



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 32$ Ω

T_j : — 25 °C
— 125 °C

figure 31. Rectifier

Reverse bias safe operating area

$I_C = f(V_{CE})$

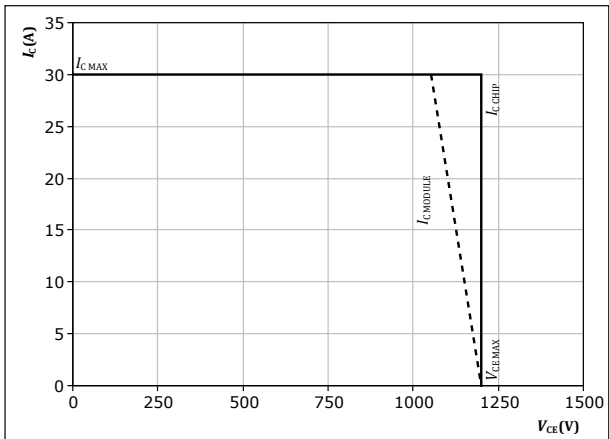
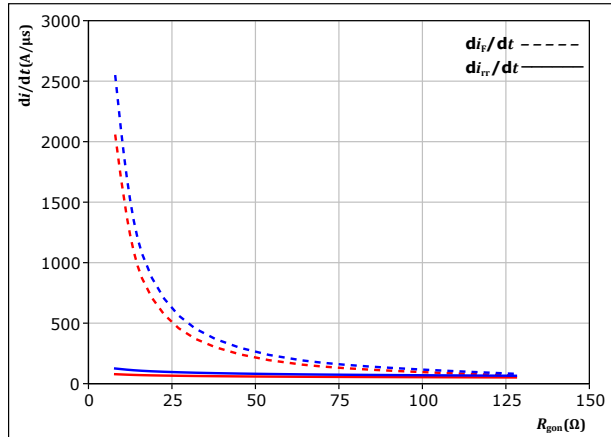


figure 32. IGBT

Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor
 $di_f/dt, di_r/dt = f(R_{gon})$



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 15$ A

T_j : — 25 °C
— 125 °C

At $T_j = 125$ °C
 $R_{gon} = 32$ Ω
 $R_{goff} = 32$ Ω



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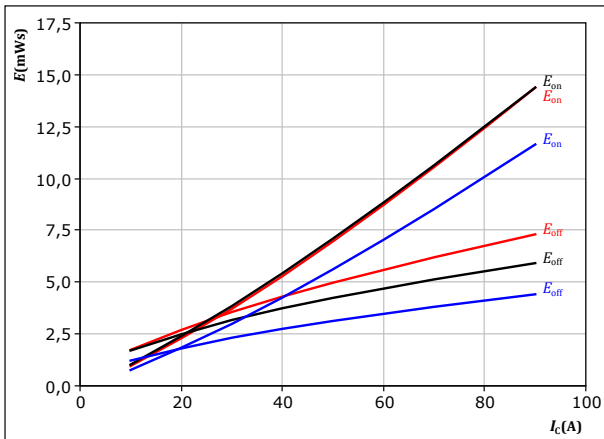
Inverter Switching Characteristics 2

figure 33.

IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_C)$$



With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 8 \text{ } \Omega$
 $R_{goff} = 8 \text{ } \Omega$

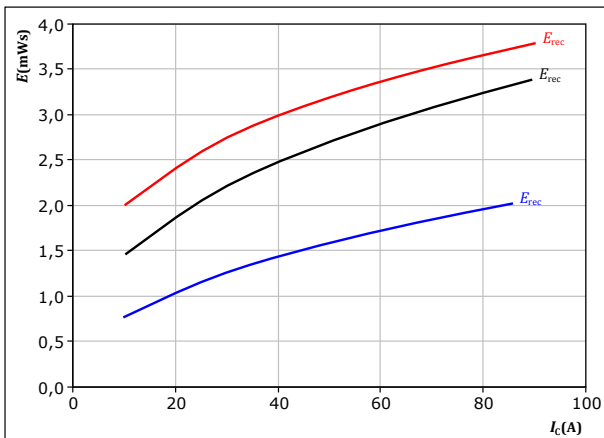
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 35.

FWD

Typical reverse recovered energy loss as a function of collector current

$$E_{rec} = f(I_C)$$



With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 8 \text{ } \Omega$

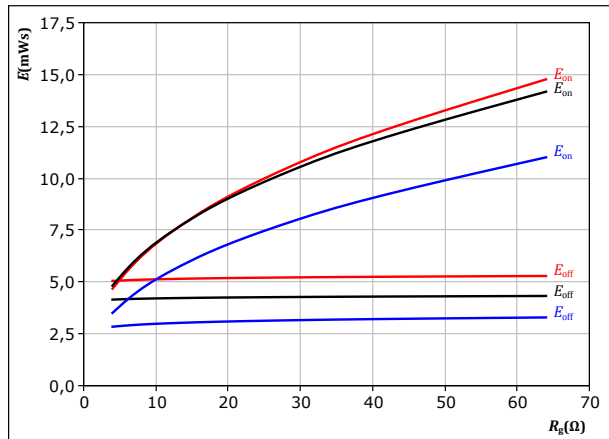
T_j :
— 25 °C
— 125 °C
— 150 °C

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

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_C = 50 \text{ A}$

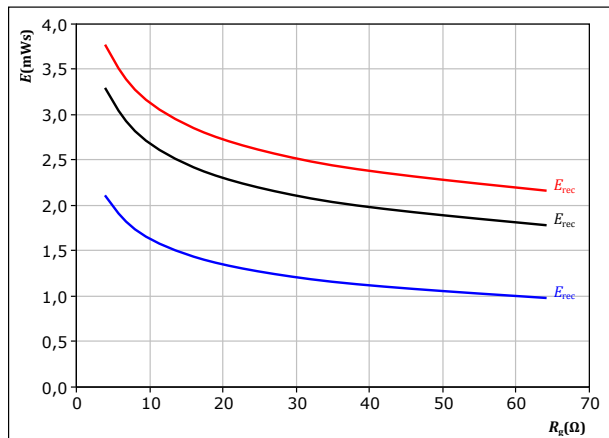
T_j :
— 25 °C
— 125 °C
— 150 °C

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

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_C = 50 \text{ A}$

T_j :
— 25 °C
— 125 °C
— 150 °C



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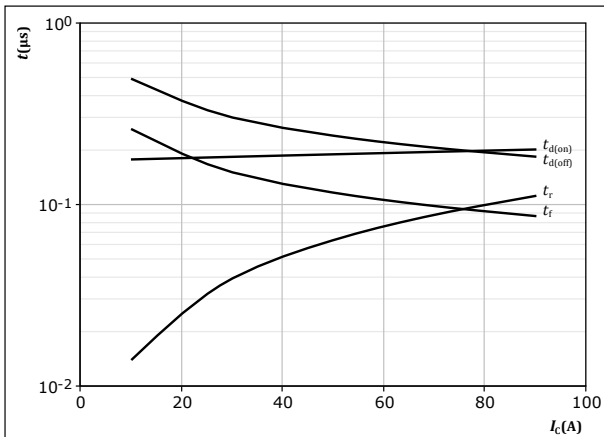
80-M212WPA050M7-K750F70 datasheet

Inverter Switching Characteristics 2

figure 37.

IGBT

Typical switching times as a function of collector current
 $t = f(I_C)$



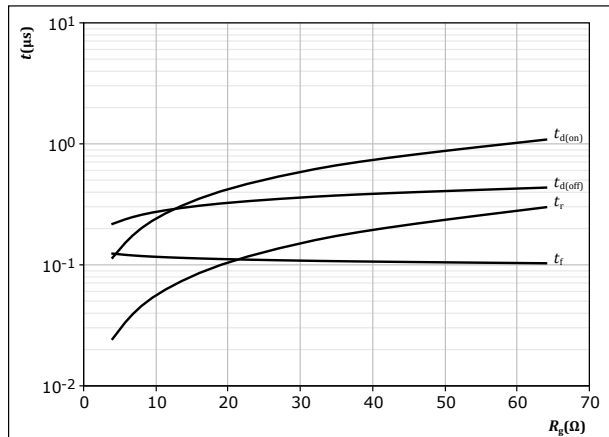
With an inductive load at

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

figure 38.

IGBT

Typical switching times as a function of IGBT turn on gate resistor
 $t = f(R_g)$



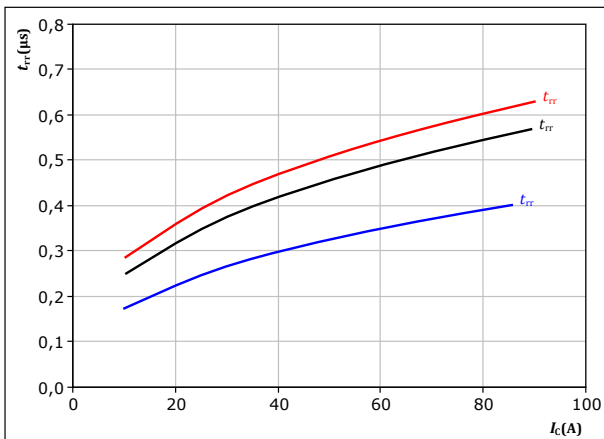
With an inductive load at

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

figure 39.

FWD

Typical reverse recovery time as a function of collector current
 $t_{rr} = f(I_C)$



With an inductive load at

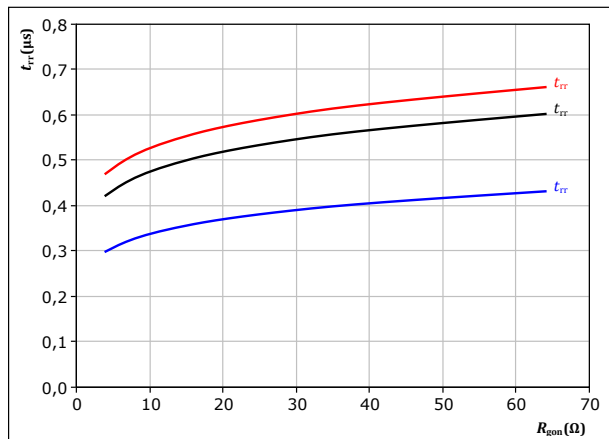
$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 8$ Ω

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

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 50$ A

T_j : 25 °C
125 °C
150 °C



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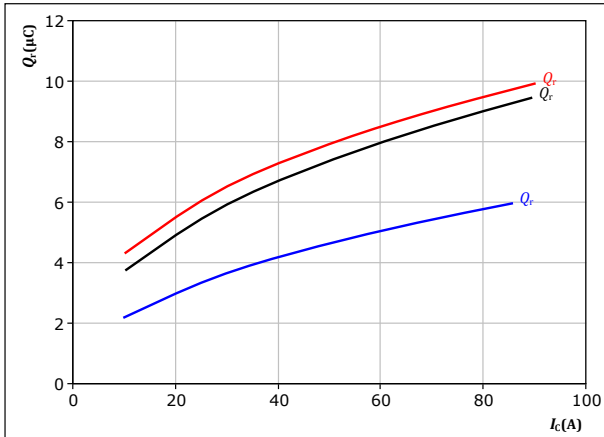
Inverter Switching Characteristics 2

figure 41.

FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 8$ Ω

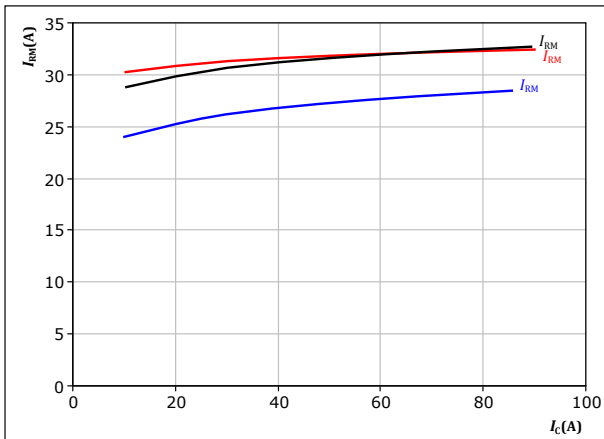
T_j : 25 °C
125 °C
150 °C

figure 43.

FWD

Typical peak reverse recovery current as a function of collector current

$$I_{RM} = f(I_c)$$



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 8$ Ω

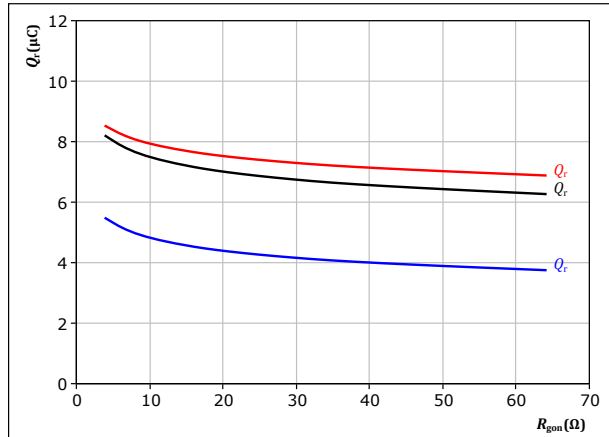
T_j : 25 °C
125 °C
150 °C

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

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 50$ A

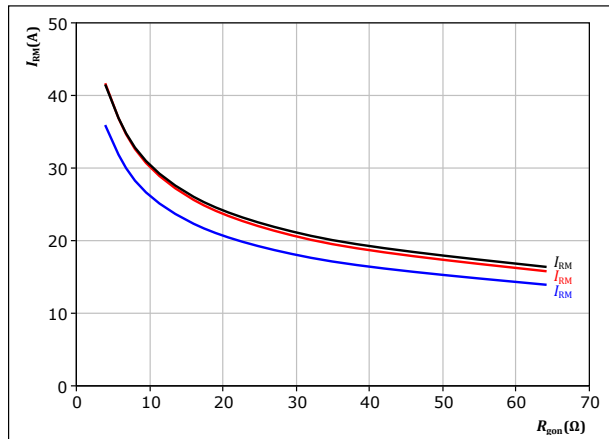
T_j : 25 °C
125 °C
150 °C

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

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 50$ A

T_j : 25 °C
125 °C
150 °C



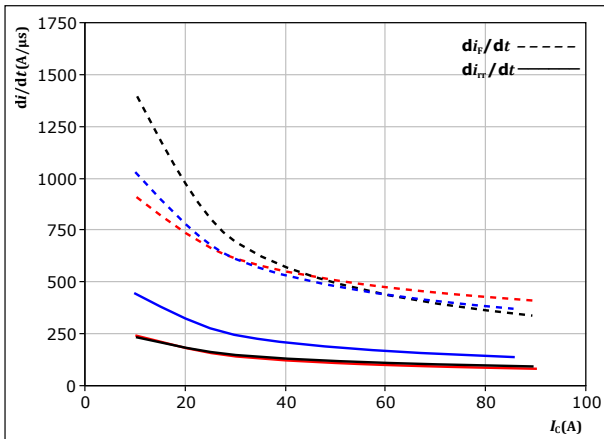
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Inverter Switching Characteristics 2

figure 45. FWD

Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_r/dt = f(I_C)$



With an inductive load at

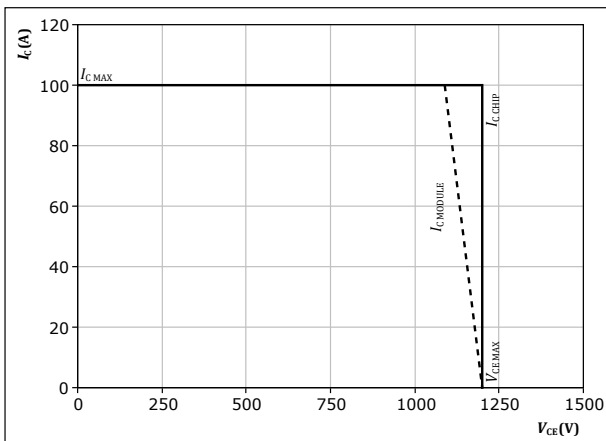
$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 8$ Ω

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 47. IGBT

Reverse bias safe operating area

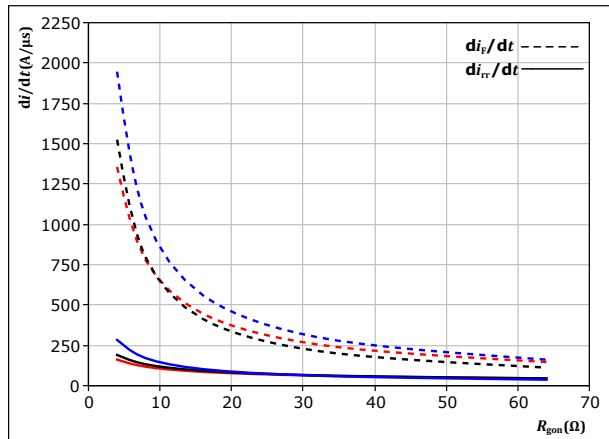
$I_C = f(V_{CE})$



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

figure 46. FWD

Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor
 $di_f/dt, di_r/dt = f(R_{gon})$



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 50$ A

T_j :
— 25 °C
— 125 °C
— 150 °C



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datasheet

Switching Definitions

figure 48. IGBT

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

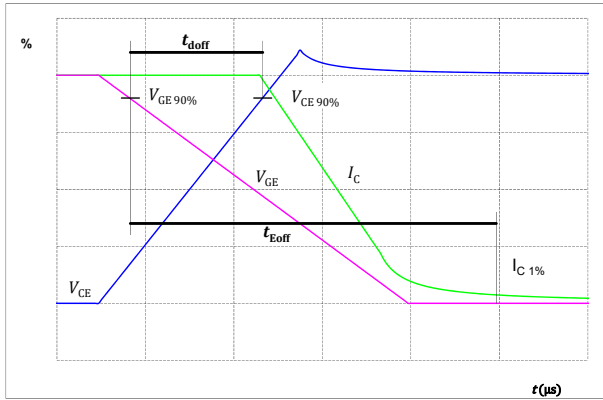


figure 49. IGBT

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

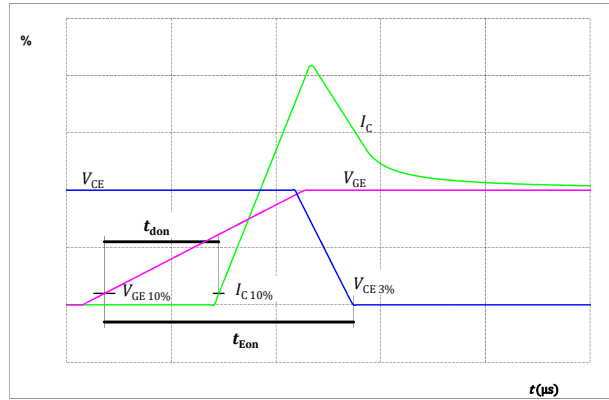


figure 50. IGBT

Turn-off Switching Waveforms & definition of t_f

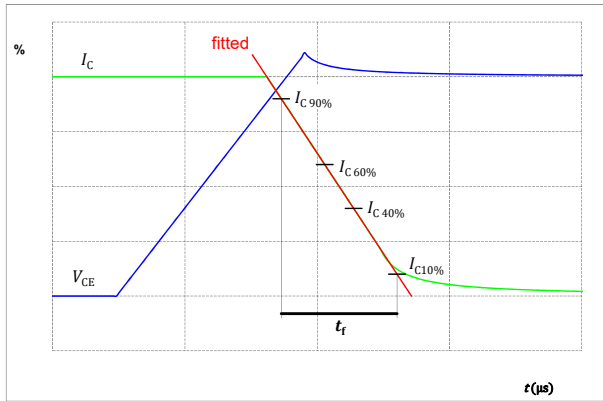
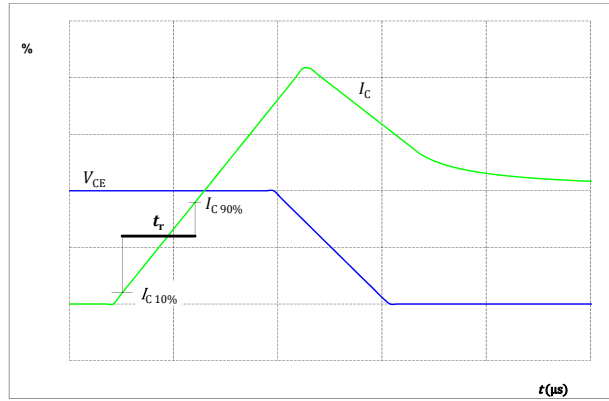


figure 51. IGBT

Turn-on Switching Waveforms & definition of t_r





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Switching Definitions

figure 52.

FWD

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

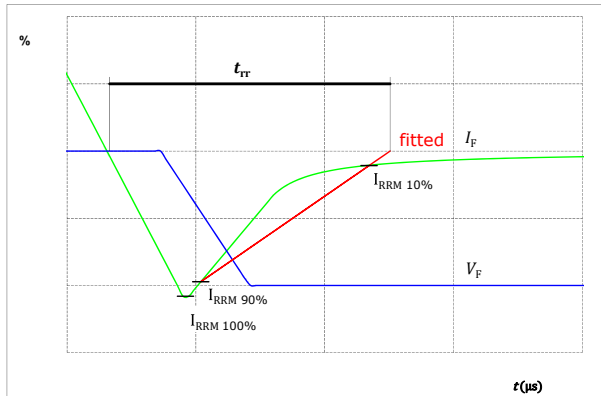
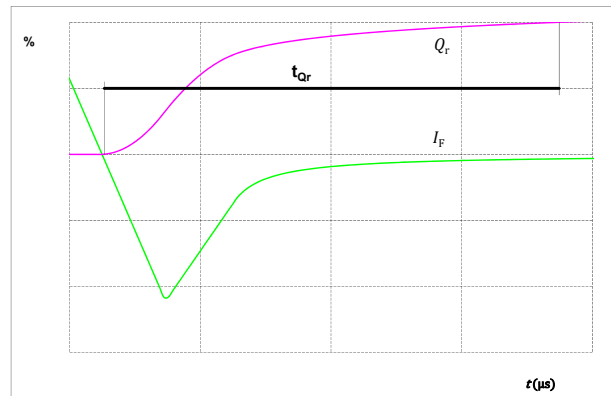


figure 53.

FWD

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





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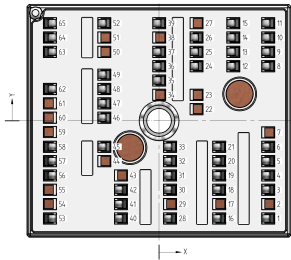
80-M212WPA050M7-K750F70

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Ordering Code	
Version	Ordering Code
With std lid (6.5mm height) + no thermal grease	80-M212WPA050M7-K750F70-/0A/
With thin lid (2.8mm height) + no thermal grease	80-M212WPA050M7-K750F70-/0B/
With std lid (6.5mm height) + thermal grease (0,8 W/mK, P12, silicone-based)	80-M212WPA050M7-K750F70-/1A/
With thin lid (2.8mm height) + thermal grease (0,8 W/mK, P12, silicone-based)	80-M212WPA050M7-K750F70-/1B/
With std lid (6.5mm height) + thermal grease (2,5 W/mK, TG20032, silicone-free)	80-M212WPA050M7-K750F70-/4A/
With thin lid (2.8mm height) + thermal grease (2,5 W/mK, TG20032, silicone-free)	80-M212WPA050M7-K750F70-/4B/
With std lid (6.5mm height) + thermal grease (2,5 W/mK, HPTP, silicone-based)	80-M212WPA050M7-K750F70-/5A/
With thin lid (2.8mm height) + thermal grease (2,5 W/mK, HPTP, silicone-based)	80-M212WPA050M7-K750F70-/5B/

Marking						
	Text	Name	Date code	UL & VIN	Lot	Serial
		NN-NNNNNNNNNNNNNNNN- TTTTTVV	WWYY	UL VIN	LLLL	SSSS
	Datamatrix	Type&Ver	Lot number	Serial	Date code	
		TTTTTVV	LLLL	SSSS	WWYY	

Outline							
Pin table [mm]							
Pin	X	Y	Function	34	not assembled		
1	24,38	-21,8	DC+2	35	0,03	9	Se1
2	not assembled			36	0,03	12,2	DC-1
3	24,38	-15,4	G26	37	0,03	15,4	DC-1
4	24,38	-12,2	S26	38	not assembled		
5	24,38	-9	Ph23	39	0,03	21,8	G13
6	24,38	-5,8	Ph23	40	-8,5	-21,8	S12
7	not assembled			41	-8,5	-18,6	Ph11
8	24,38	12,2	G25	42	-8,5	-15,4	Ph11
9	24,38	15,4	DC-23	43	not assembled		
10	24,38	18,6	DC-23	44	not assembled		
11	24,38	21,8	Therm2	45	-12,22	-5,8	G11
12	16,58	12,2	G23	46	-12,22	0,7	G14
13	16,58	15,4	DC-22	47	-12,22	3,9	S14
14	16,58	18,6	DC-22	48	-12,22	7,1	Ph12
15	16,58	21,8	Therm1	49	-12,22	10,3	Ph12
16	13,42	-21,8	DC+2	50	not assembled		
17	not assembled			51	not assembled		
18	13,42	-15,4	G24	52	-12,22	21,8	G15
19	13,42	-12,2	S24	53	-24,38	-21,8	G12
20	13,42	-9	Ph22	54	not assembled		
21	13,42	-5,8	Ph22	55	not assembled		
22	not assembled			56	-24,38	-12,2	DC+1
23	not assembled			57	-24,38	-9	DC+1
24	8,38	12,2	G21	58	-24,38	-5,8	DC+1
25	8,38	15,4	DC-21	59	not assembled		
26	8,38	18,6	DC-21	60	not assembled		
27	not assembled			61	not assembled		
28	2,46	-21,8	DC+2	62	-24,38	7,1	G16
29	not assembled			63	-24,38	15,4	S16
30	2,46	-15,4	G22	64	-24,38	18,6	Ph13
31	2,46	-12,2	S22	65	-24,38	21,8	Ph13
32	2,46	-9	Ph21				
33	2,46	-5,8	Ph21				



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

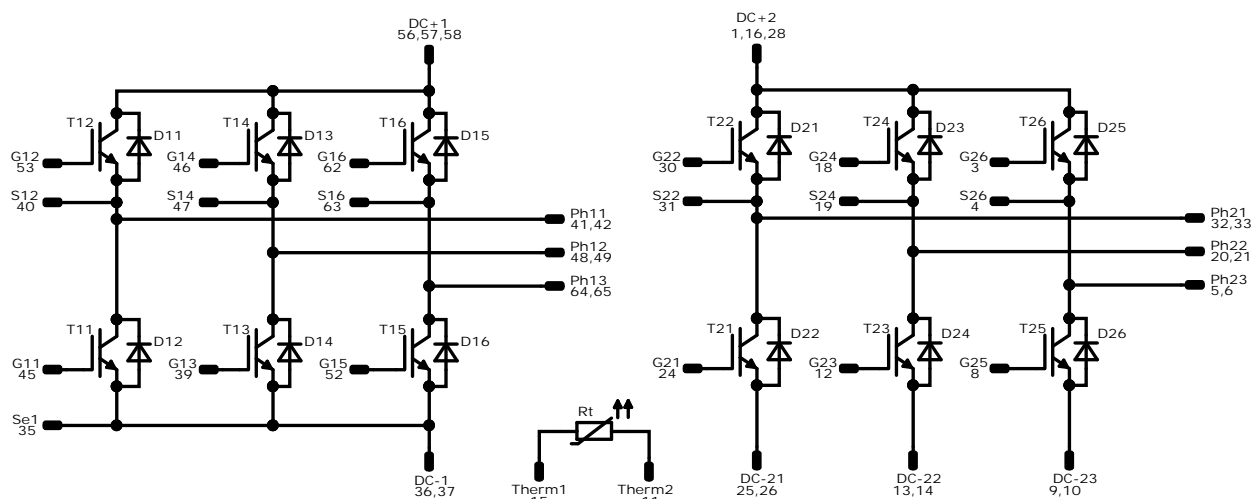


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datasheet

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14, T15, T16	IGBT	1200 V	15 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	Rectifier	1600 V	18 A	Inverter Diode	
T21, T22, T23, T24, T25, T26	IGBT	1200 V	50 A	Inverter Switch 2	
D21, D22, D23, D24, D25, D26	FWD	1200 V	50 A	Inverter Diode 2	
Rt	Thermistor			Thermistor	



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datasheet

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

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

Package data
Package data for MiniSKiiP® 2 packages see vincotech.com website.

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

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



Document No.:	Date:	Modification:	Pages
80-M212WPA050M7-K750F70-D5-14	5 May. 2022	New Datasheet format, module is unchanged Correct tau values of thermal characteristic Selected Rg changed of Inverter Switching 2	

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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.