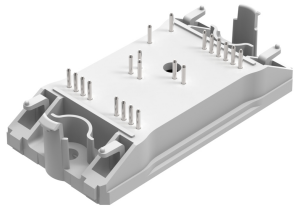
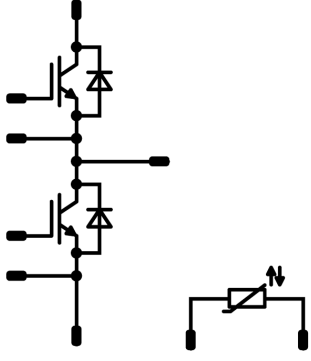




<i>flow</i> PHASE 0 + NTC		1200 V / 50 A
<p>Features</p> <ul style="list-style-type: none">• High efficiency IGBT• Full current FWD• Thermistor	<p>flow 0 12 mm housing</p> 	
<p>Target applications</p> <ul style="list-style-type: none">• Industrial Drives• Power Supply• Solar• UPS• Welding & Cutting	<p>Schematic</p> 	
<p>Types</p> <ul style="list-style-type: none">• 10-FZ122PB050SC02-M817F08		



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Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
Half-Bridge Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	56	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	144	W
Gate-emitter voltage	V_{GES}		± 20	V
Short circuit ratings	t_{SC}	$V_{GE} = 15\text{ V}$, $V_{CC} = 800\text{ V}$ $T_j = 150\text{ °C}$	10	μs
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$

Half-Bridge Diode

Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	53	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	100	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	90	W
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$

Module Properties

Thermal Properties

Storage temperature	T_{stg}		-40...+125	$^{\circ}\text{C}$
Operation temperature under switching condition	T_{jop}		-40...+($T_{jmax} - 25$)	$^{\circ}\text{C}$

Isolation Properties

Isolation voltage	V_{isol}	DC Test Voltage* $t_p = 2\text{ s}$	6000	V
Isolation voltage	V'_{isol}	AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			>12,7	mm
Clearance			9,12	mm
Comparative Tracking Index	CTI		>200	

*100 % tested in production



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Characteristic Values

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

Half-Bridge 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	$V_{CE(sat)}$		15		50	25 150	1,58	1,93 2,34	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}	$f = 1 \text{ Mhz}$	0	25		25		2800		pF
Reverse transfer capacitance	C_{res}									
Gate charge	Q_g		15		0	25		380		nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4 \text{ W/mK}$ (PSX)						0,66		K/W
--	---------------	---	--	--	--	--	--	------	--	-----

Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 8 \Omega$ $R_{goff} = 8 \Omega$	±15	600	50	25		96,2		ns
Rise time	t_r					150		100,8		ns
Turn-off delay time	$t_{d(off)}$					25		17,2		ns
Fall time	t_f					150		23,6		ns
Turn-on energy (per pulse)	E_{on}					25		214		ns
Turn-off energy (per pulse)	E_{off}					150		281,4		ns
		25		86,48		ns				
		150		121,84		ns				
		25		2,7		mWs				
		150		4,21		mWs				
		25		2,74		mWs				
		150		4,53		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		

Half-Bridge Diode

Static

Forward voltage	V_F				50	25 125 150	1,35	1,73 1,7 1,68	2,05 ⁽¹⁾	V
Reverse leakage current	I_R	$V_T = 1200$ V				25			10	μA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						1,06		K/W
--	---------------	---------------------------------------	--	--	--	--	--	------	--	-----

Dynamic

Peak recovery current	I_{RRM}	$di/dt=3866$ A/μs $di/dt=2820$ A/μs	±15	600	50	25		81,08		A
						150		84,75		
Reverse recovery time	t_{rr}					25		139,07		
						150		315,77		
Recovered charge	Q_r					25		4,8		
		150		9,71						
Reverse recovered energy	E_{rec}	25		1,79						
		150		3,97						
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$	25		4803						
		150		1209						



Vincotech

Characteristic Values

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

Thermistor

Static

Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$A_{R/R}$	$R_{100} = 1484 \Omega$				100	-5		5	%
Power dissipation	P							5		mW
Power dissipation constant	d					25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 1 \%$						3962		K
B-value	$B_{(25/100)}$	Tol. $\pm 1 \%$						4000		K
Vincotech Thermistor Reference									I	

⁽¹⁾ Value at chip level

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

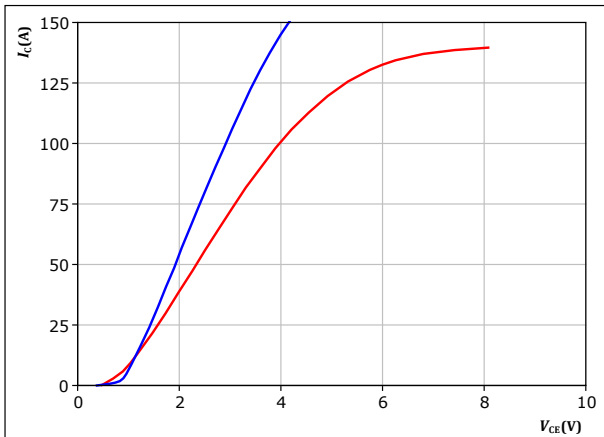


Half-Bridge Switch Characteristics

figure 1. IGBT

Typical output characteristics

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

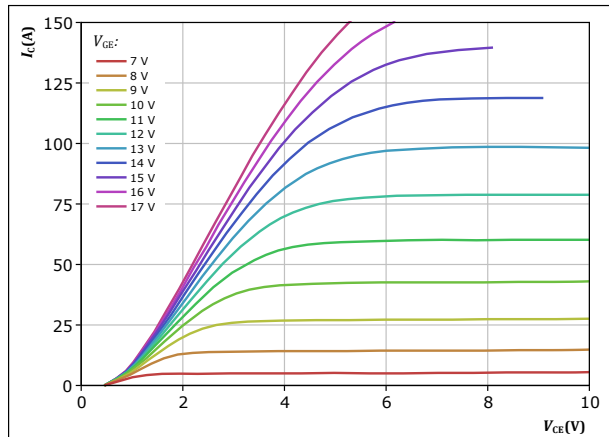


$t_p = 250 \mu s$
 $V_{GE} = 15 V$
 $T_j: 25^\circ C$ (blue), $150^\circ C$ (red)

figure 2. IGBT

Typical output characteristics

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

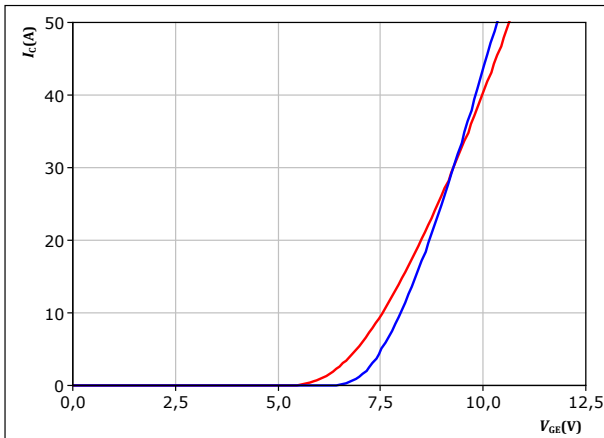


$t_p = 250 \mu s$
 $T_j = 150^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

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

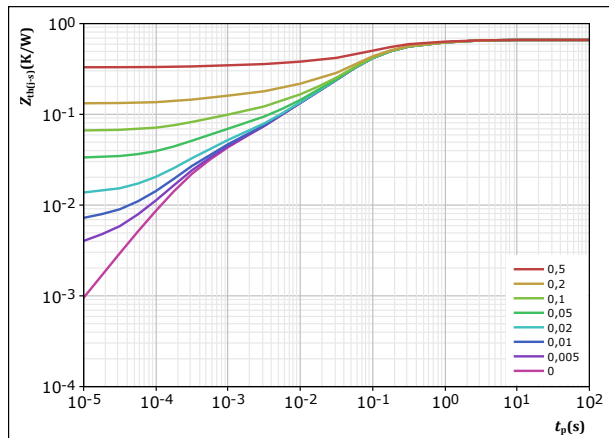


$t_p = 250 \mu s$
 $V_{CE} = 10 V$
 $T_j: 25^\circ C$ (blue), $150^\circ C$ (red)

figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,66 K/W$
IGBT thermal model values

R (K/W)	τ (s)
8,54E-02	1,27E+00
1,79E-01	1,86E-01
3,14E-01	6,03E-02
5,28E-02	4,65E-03
2,90E-02	3,68E-04



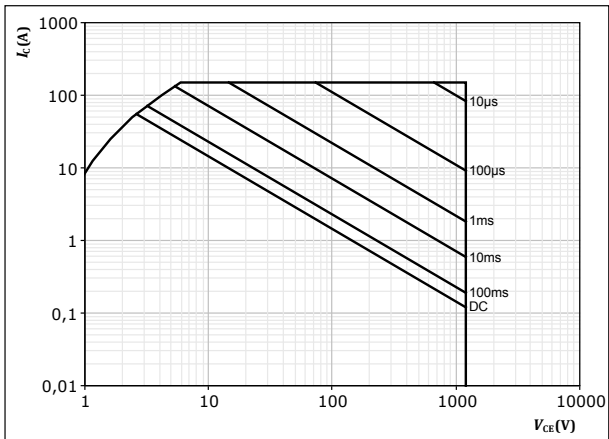
Vincotech

Half-Bridge Switch Characteristics

figure 5. IGBT

Safe operating area

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



$D =$ single pulse

$T_s = 80$ °C

$V_{CE} = 15$ V

$T_j = T_{jmax}$



Half-Bridge Diode Characteristics

figure 6. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

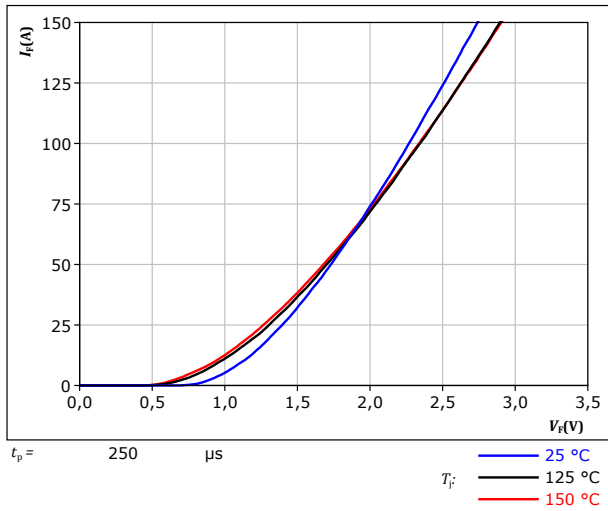
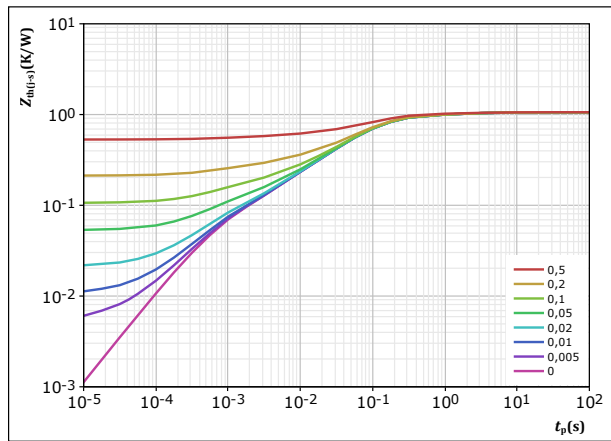


figure 7. FWD

Transient thermal impedance as a function of pulse width

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



$D =$	t_p / T	
$R_{th(j-s)} =$	1,061	K/W
FWD thermal model values		
R (K/W)	τ (s)	
4,19E-02	4,68E+00	
8,50E-02	8,80E-01	
4,99E-01	1,21E-01	
2,83E-01	4,12E-02	
9,28E-02	6,53E-03	
5,92E-02	6,76E-04	

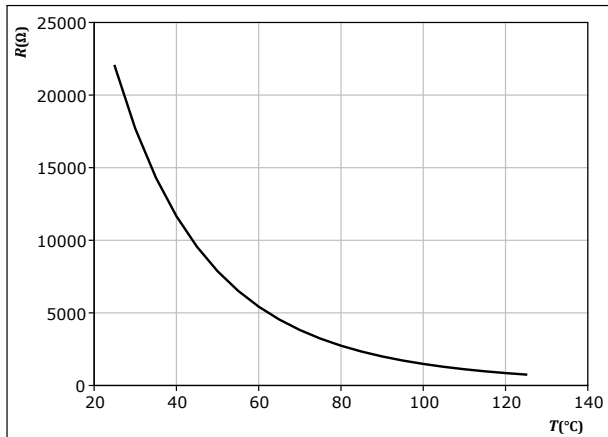


Thermistor Characteristics

figure 8. Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$

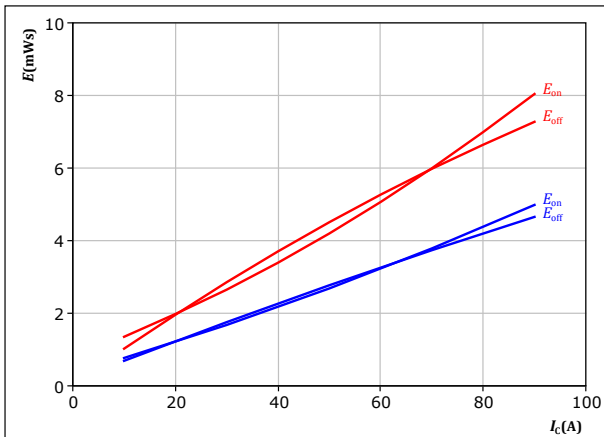




Half-Bridge Switching Characteristics

figure 9. IGBT

Typical switching energy losses as a function of collector current
 $E = f(I_c)$



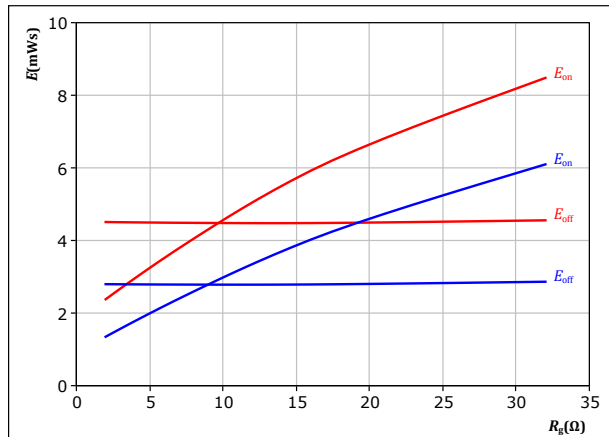
With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{g(on)} = 8$ Ω
 $R_{g(off)} = 8$ Ω

T_j : — 25 °C
 — 150 °C

figure 10. IGBT

Typical switching energy losses as a function of gate resistor
 $E = f(R_g)$



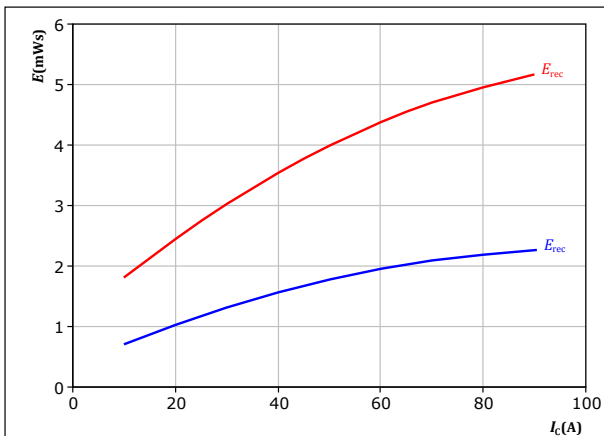
With an inductive load at

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

T_j : — 25 °C
 — 150 °C

figure 11. FWD

Typical reverse recovered energy loss as a function of collector current
 $E_{rec} = f(I_c)$



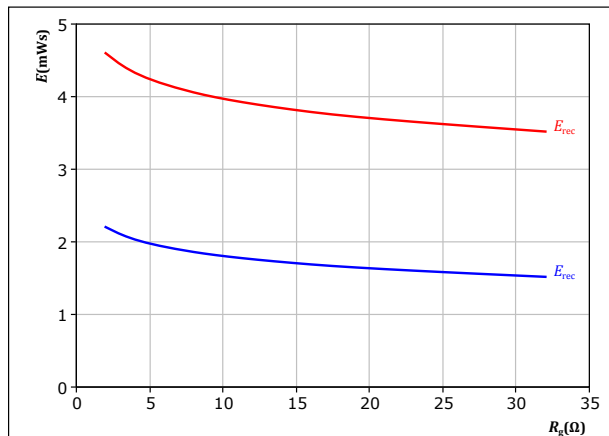
With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{g(on)} = 8$ Ω

T_j : — 25 °C
 — 150 °C

figure 12. FWD

Typical reverse recovered energy loss as a function of gate resistor
 $E_{rec} = f(R_g)$



With an inductive load at

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

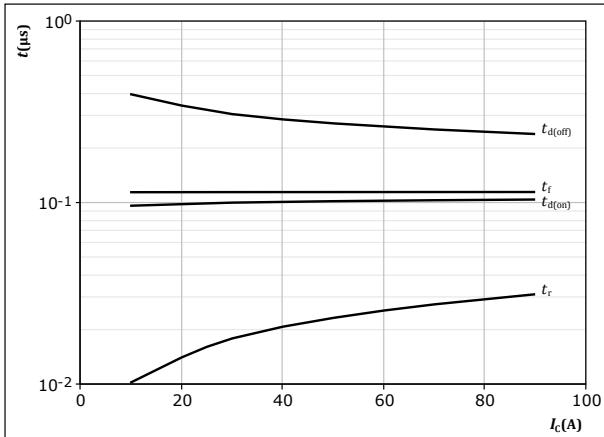
T_j : — 25 °C
 — 150 °C



Half-Bridge Switching Characteristics

figure 13. IGBT

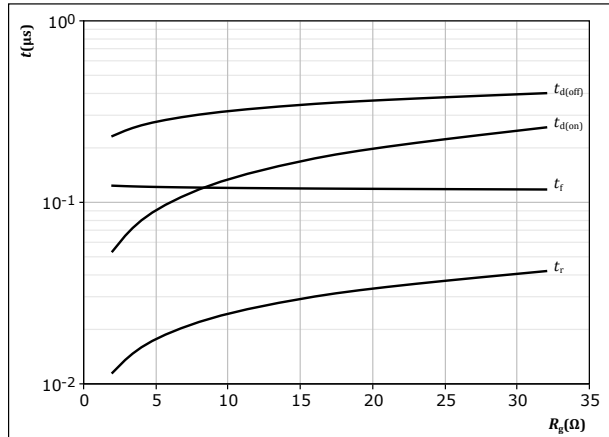
Typical switching times as a function of collector current
 $t = f(I_C)$



With an inductive load at
 $T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{g(on)} = 8$ Ω
 $R_{g(off)} = 8$ Ω

figure 14. IGBT

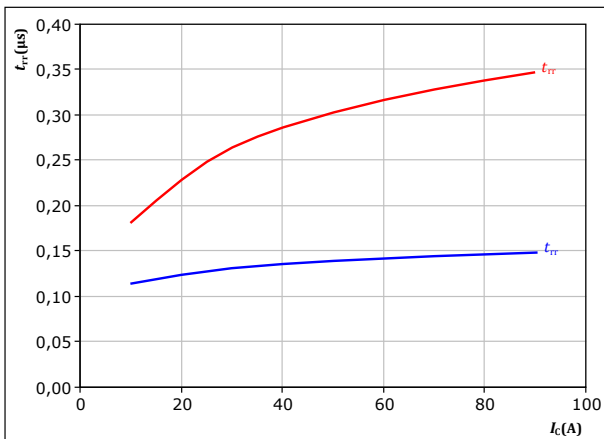
Typical switching times as a function of gate resistor
 $t = f(R_g)$



With an inductive load at
 $T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 50$ A

figure 15. FWD

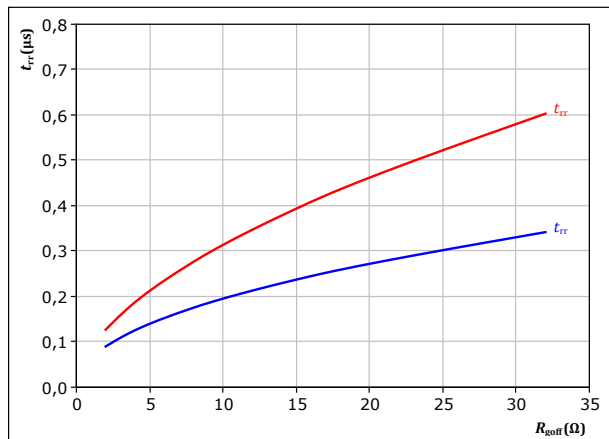
Typical reverse recovery time as a function of collector current
 $t_{rr} = f(I_C)$



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{g(on)} = 8$ Ω
 T_j : — 25 °C
— 150 °C

figure 16. FWD

Typical reverse recovery time as a function of IGBT turn off gate resistor
 $t_{rr} = f(R_{g(off)})$



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 50$ A
 T_j : — 25 °C
— 150 °C

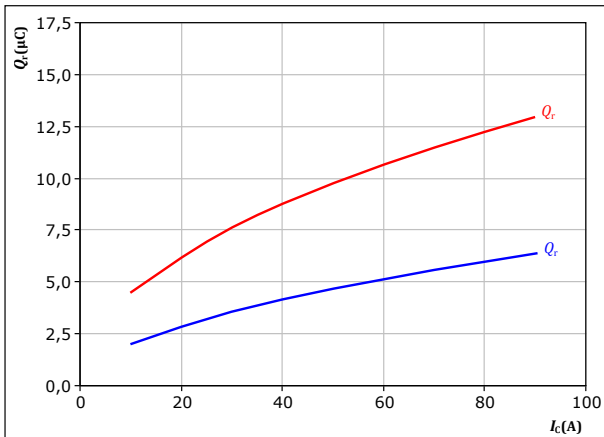


Half-Bridge Switching Characteristics

figure 17. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

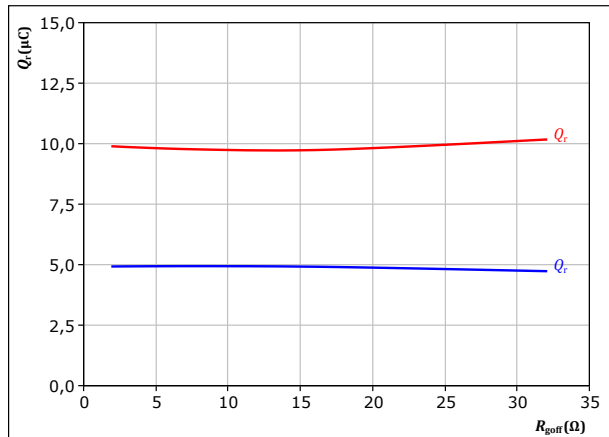
$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{goff} = 8$ Ω

T_j : — 25 °C
— 150 °C

figure 18. FWD

Typical recovered charge as a function of turn off gate resistor

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



With an inductive load at

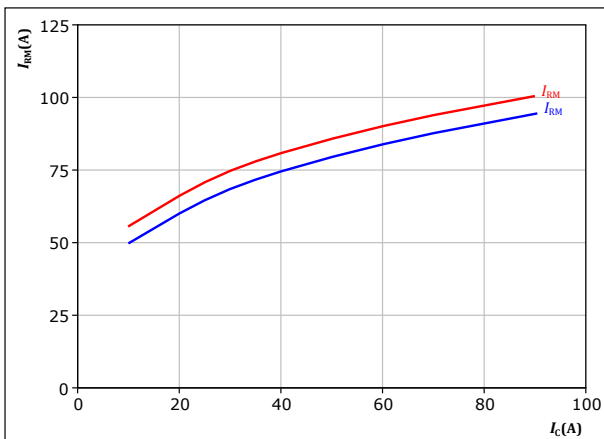
$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 50$ A

T_j : — 25 °C
— 150 °C

figure 19. FWD

Typical peak reverse recovery current as a function of collector current

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



With an inductive load at

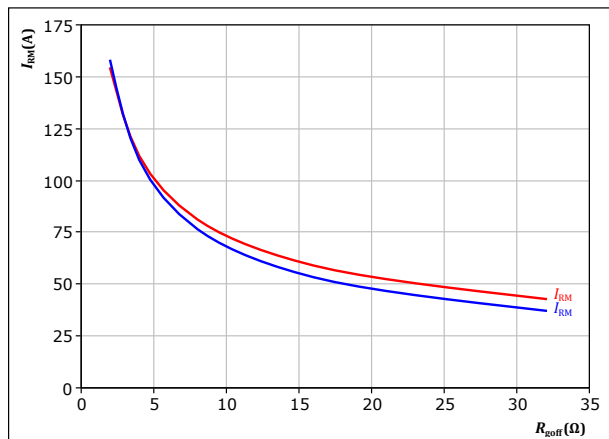
$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{goff} = 8$ Ω

T_j : — 25 °C
— 150 °C

figure 20. FWD

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

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



With an inductive load at

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

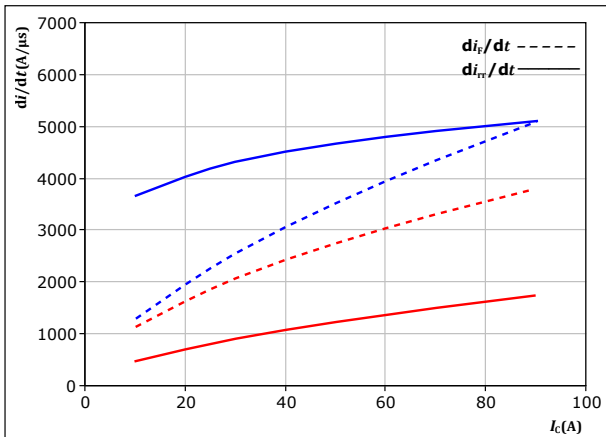
T_j : — 25 °C
— 150 °C



Half-Bridge Switching Characteristics

figure 21. FWD

Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_{rr}/dt = f(I_c)$



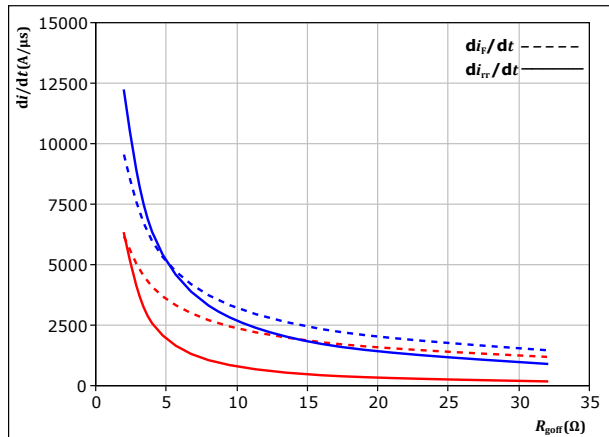
With an inductive load at

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

T_j : — 25 °C
 — 150 °C

figure 22. FWD

Typical rate of fall of forward and reverse recovery current as a function of turn off gate resistor
 $di_f/dt, di_{rr}/dt = f(R_{goff})$



With an inductive load at

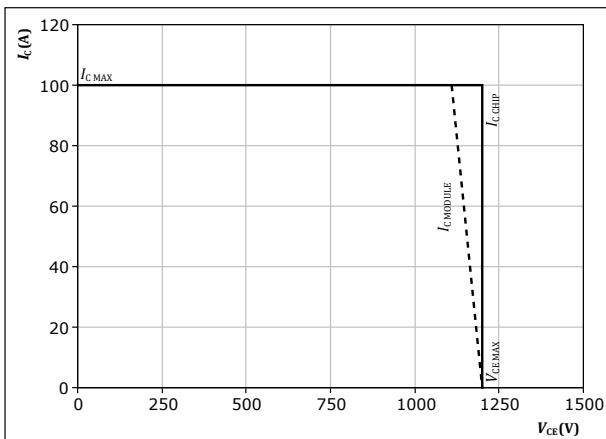
$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 50$ A

T_j : — 25 °C
 — 150 °C

figure 23. IGBT

Reverse bias safe operating area

$I_c = f(V_{CE})$



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



Half-Bridge Switching Definitions

figure 24. IGBT

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

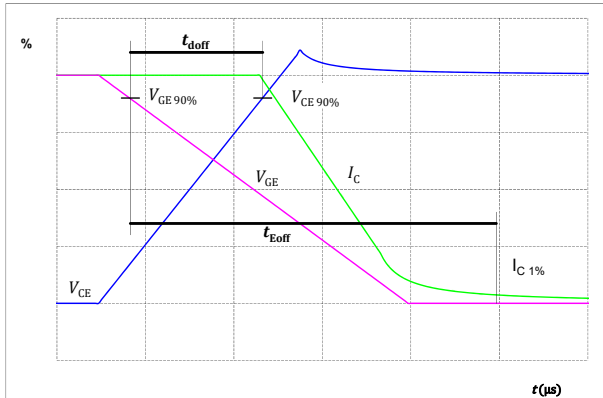


figure 25. IGBT

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

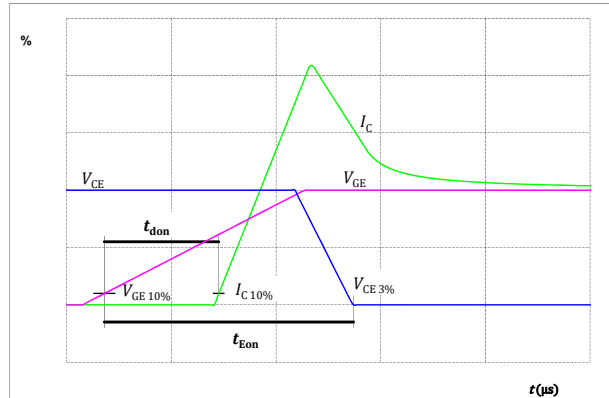


figure 26. IGBT

Turn-off Switching Waveforms & definition of t_f

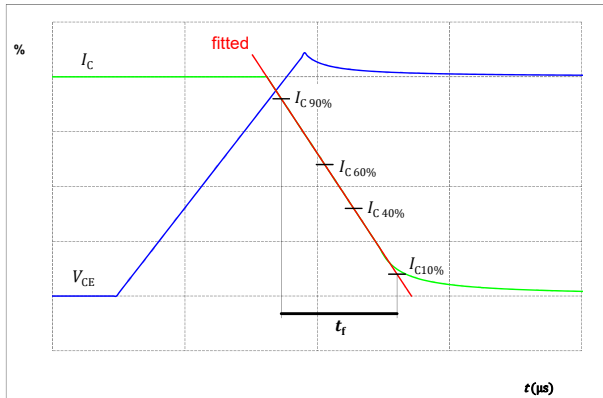
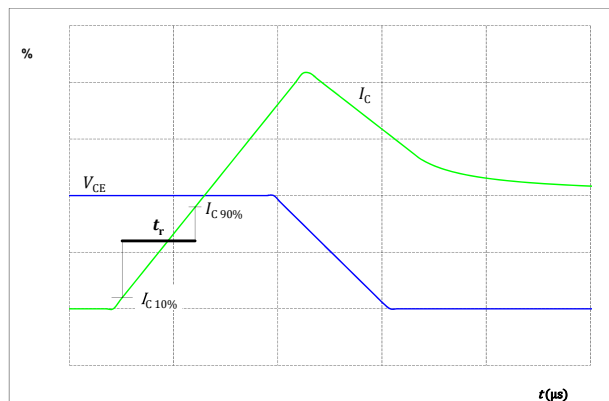


figure 27. IGBT

Turn-on Switching Waveforms & definition of t_r





Half-Bridge Switching Definitions

figure 28. FWD

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

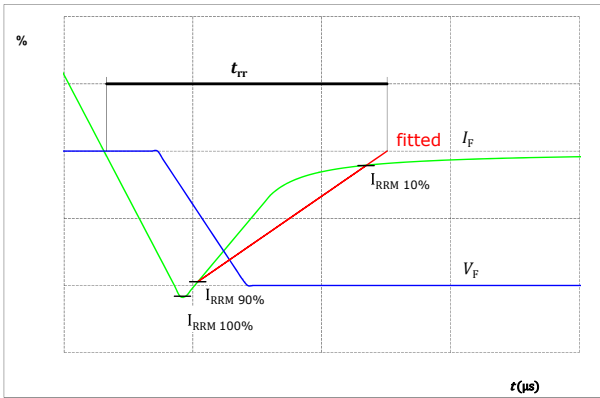
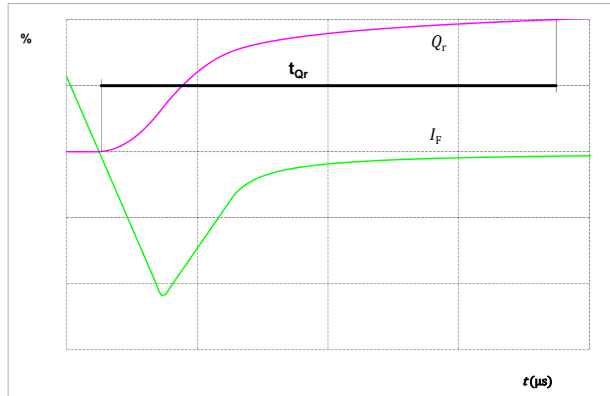


figure 29. FWD

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





Vincotech

10-FZ122PB050SC02-M817F08
datasheet

Ordering Code	
Version	Ordering Code
Without thermal paste	10-FZ122PB050SC02-M817F08
With thermal paste (5,2 W/mK, PTM6000HV)	10-FZ122PB050SC02-M817F08-/7/
With thermal paste (3,4 W/mK, PSX-P7)	10-FZ122PB050SC02-M817F08-/3/

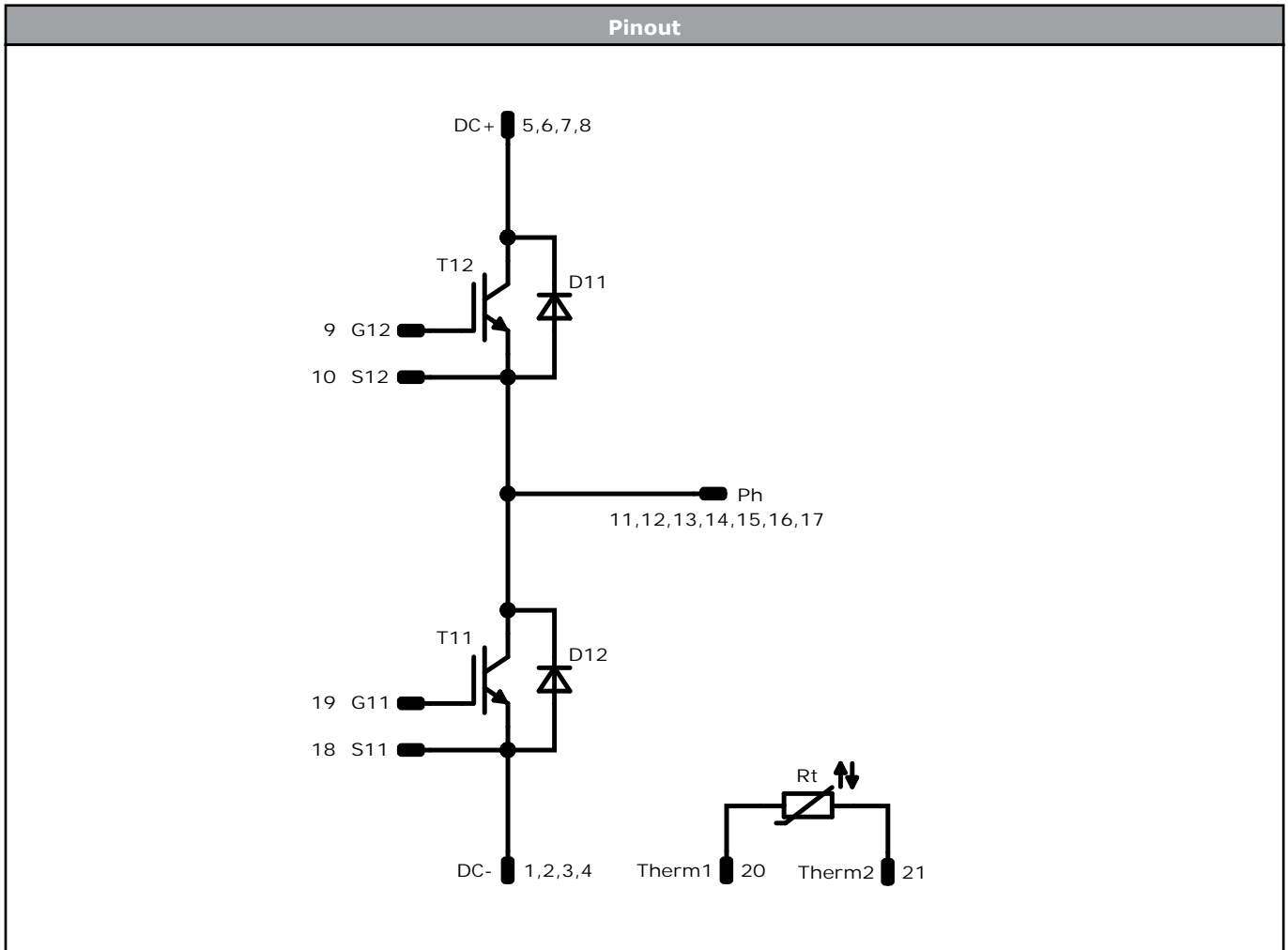
Marking						
	Text	Name NN-NNNNNNNNNNNNNN- TTTTIV	Date code WWYY	UL & VIN UL VIN	Lot LLLLL	Serial SSSS
	Datamatrix	Type&Ver TTTTIV	Lot number LLLLL	Serial SSSS	Date code WWYY	

Pin table [mm]				Outline
Pin	X	Y	Function	
1	0	0	DC-	
2	0	2,3	DC-	
3	0	4,6	DC-	
4	0	6,9	DC-	
5	0	15,6	DC+	
6	0	17,9	DC+	
7	0	20,2	DC+	
8	0	22,5	DC+	
9	13,85	16,45	G12	
10	16,75	16,45	S12	
11	33,5	11,5	Ph	
12	33,5	9,2	Ph	
13	33,5	6,9	Ph	
14	33,5	4,6	Ph	
15	33,5	2,3	Ph	
16	33,5	0	Ph	
17	13,85	13,55	Ph	
18	19,55	4,95	S11	
19	19,55	7,85	G11	
20	33,5	22,5	Therm1	
21	26,1	22,5	Therm2	

Tolerance of pinpositions: ±0.5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance



Vincotech



Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T12	IGBT	1200 V	50 A	Half-Bridge Switch	
D11, D12	FWD	1200 V	50 A	Half-Bridge Diode	
Rt	Thermistor			Thermistor	




Vincotech

Packaging instruction				
Standard packaging quantity (SPQ) 135	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for <i>flow 0</i> packages see vincotech.com website.

Package data
Package data for <i>flow 0</i> 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-FZ122PB050SC02-M817F08-D2-14	7 Sep. 2021	Switch static characteristics updated New datasheet format, module is unchanged	

DISCLAIMER

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