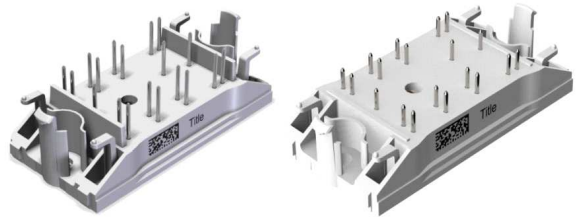
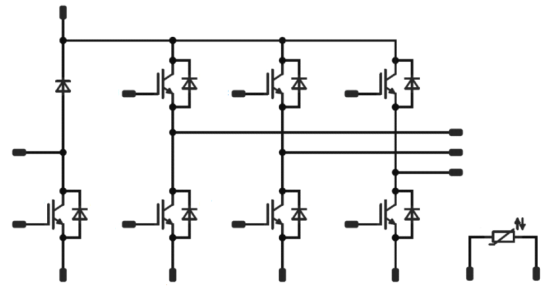




Vincotech

10-F0127PA0008SC-L156E09
10-FZ127PA0008SC-L156E08
 datasheet

flow 7PACK 0		1200 V / 8 A
Features	• Compact flow 0 housing • Trench Fieldstop IGBT4 technology • Compact and low inductance layout • Built-in NTC	flow 0 housing 
Target applications	• Motor Drives • Power Generation	
Types	• 10-F0127PA0008SC-L156E09 • 10-FZ127PA0008SC-L156E08	
		Schematic 

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
Inverter Switch\ Brake Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current	I_{C}	$T_j=T_{j\text{max}}$ $T_s=80^{\circ}\text{C}$	16	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{j\text{max}}$	24	A
Total power dissipation	P_{tot}	$T_j=T_{j\text{max}}$ $T_s=80^{\circ}\text{C}$	61	W
Gate-emitter voltage	V_{GES}		± 20	V
Maximum Junction Temperature	$T_{j\text{max}}$		175	$^{\circ}\text{C}$



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 datasheet

Parameter	Symbol	Conditions	Value	Unit
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Inverter Diode\ Brake Diode

Peak Repetitive Reverse Voltage	V_{RRM}		1200	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_h = 80^\circ\text{C}$	20	A
Repetitive peak forward current	I_{FRM}		20	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_h = 80^\circ\text{C}$	46	W
Maximum Junction Temperature	T_{jmax}		175	$^\circ\text{C}$

Parameter	Symbol	Conditions	Value	Unit
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Brake Inverse Diode

Peak Repetitive Reverse Voltage	V_{RRM}		1200	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_h = 80^\circ\text{C}$	6	A
Repetitive peak forward current	I_{FRM}		6	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_h = 80^\circ\text{C}$	25	W
Maximum Junction Temperature	T_{jmax}		150	$^\circ\text{C}$

Parameter	Symbol	Conditions	Value	Unit
-----------	--------	------------	-------	------

Module Properties

Thermal Properties

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

Isolation Properties

Isolation voltage	V_{isol}	DC voltage	$t_p = 2\text{s}$	4000	V
Creepage distance				min 12,7	mm
Clearance				min 12,7	mm
Comparative Tracking Index	CTI			>200	



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 datasheet

Characteristic Values

Inverter Switch \ Brake Switch

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE}=V_{CE}$			0,0005	25 125	5,3	5,8	6,3	V
Collector-emitter saturation voltage	V_{CEsat}		15		8	25 125 150	1,58	1,85 -	2,07	V
Collector-emitter cut-off current	I_{CES}		0	1200		25 125			1	µA
Gate-emitter leakage current	I_{GES}		20	0		25 125			120	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f=1 MHz	0	25		25		490		pF
Reverse transfer capacitance	C_{res}							30		

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	Phase-Change Material $\lambda=3,4W/mK$						1,57		K/W
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IGBT Switching

Turn-on delay time	$t_{d(on)}$	$R_{goff} = 32 \Omega$ $R_{gon} = 32 \Omega$	± 15	600	8	25 125 150		71 71 72		ns
Rise time	t_r					25 125 150		19 23 22		
Turn-off delay time	$t_{d(off)}$					25 125 150		194 236 250		
Fall time	t_f					25 125 150		79 108 110		
Turn-on energy (per pulse)	E_{on}	$Q_{rFWD} = 0,9 \mu C$ $Q_{rFWD} = 1,6 \mu C$ $Q_{rFWD} = 1,7 \mu C$	± 15	600	8	25 125 150		0,499 0,748 0,796		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,435 0,624 0,657		



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 datasheet

Inverter Diode\ Brake Diode

Parameter	Symbol	Conditions					Value			Unit
				V_r [V]	I_F [A]	T_j [°C]	Min	Typ	Max	
Static										
Forward voltage	V_F				10	25 125 150		1,76 - 1,68	2,05	V
Reverse leakage current	I_r			1200		25 150			2,7 -	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	Phase-Change Material $\lambda=3,4\text{W/mK}$						2,07		K/W
FWD Switching										
Peak recovery current	I_{RRM}	$di/dt = 452\text{ A/}\mu\text{s}$ $di/dt = 399\text{ A/}\mu\text{s}$ $di/dt = 403\text{ A/}\mu\text{s}$	± 15	600	8	25 125 150		8 10 10		A
Reverse recovery time	t_{rr}					25 125 150		251 383 411		ns
Recovered charge	Q_r					25 125 150		0,885 1,569 1,721		µC
Reverse recovered energy	E_{rec}					25 125 150		0,345 0,635 0,692		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		84 69 64		A/µs



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 datasheet

Brake Inverse Diode

Parameter	Symbol	Conditions					Value			Unit
				V_r [V]	I_F [A]	T_j [°C]	Min	Typ	Max	

Static

Forward voltage	V_F				3	25 125 150		1,65 - 1,51	1,6	V
Reverse leakage current	I_r			1200		25 150			250 -	μA

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	Phase-Change Material $\lambda=3,4\text{W/mK}$						2,8		K/W
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Thermistor

Parameter	Symbol	Conditions					Value			Unit
			V_{CE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	
Rated resistance	R					25		21,5		kΩ
Deviation of R100	$\Delta_{R/R}$	R100=1486 Ω				100	-4,5		+4,5	%
Power dissipation	P					25		210		mW
Power dissipation constant						25		3,5		mW/K
B-value	$B_{(25/50)}$					25		3884		K
B-value	$B_{(25/100)}$					25		3964		K
Vincotech NTC Reference									F	



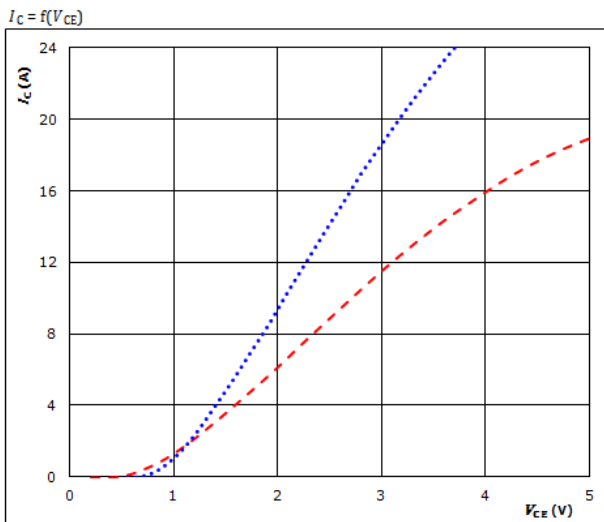
Vincotech

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 datasheet

Inverter Switch\ Brake Switch Characteristics

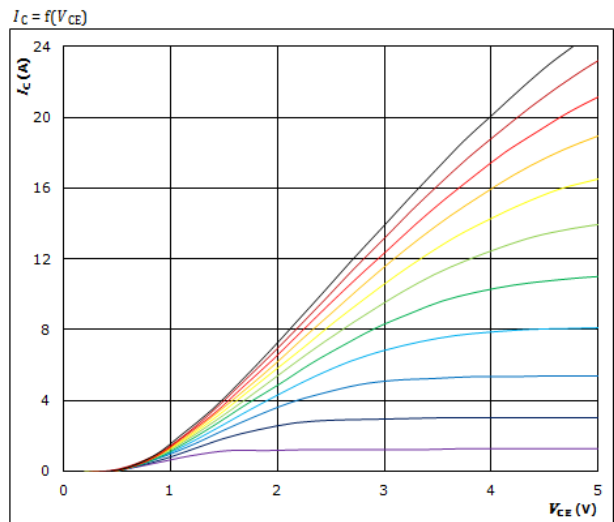
Typical output characteristics

IGBT



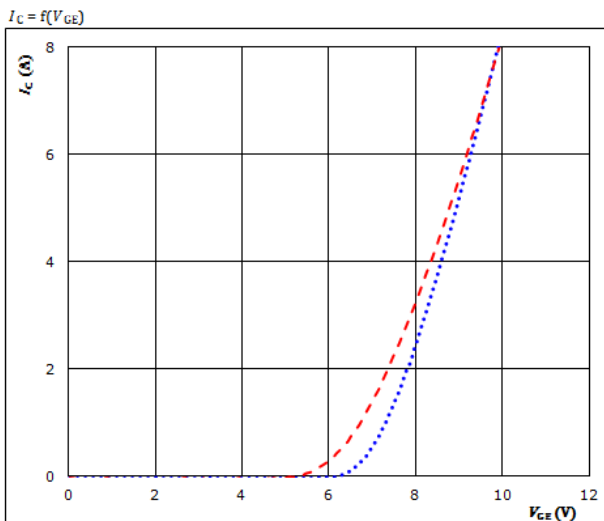
Typical output characteristics

IGBT



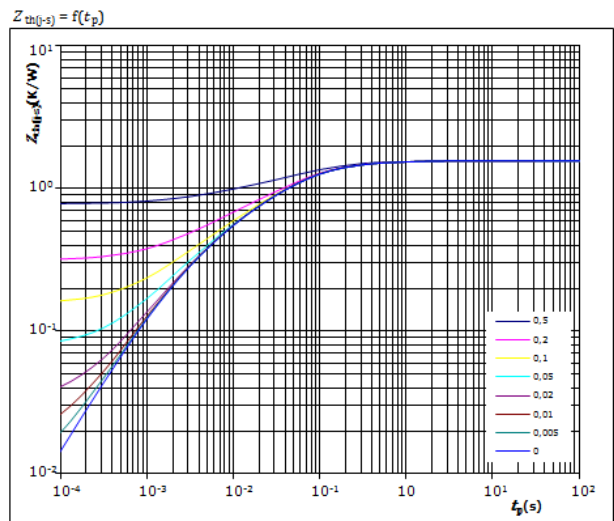
Typical transfer characteristics

IGBT



Transient Thermal Impedance as function of Pulse duration

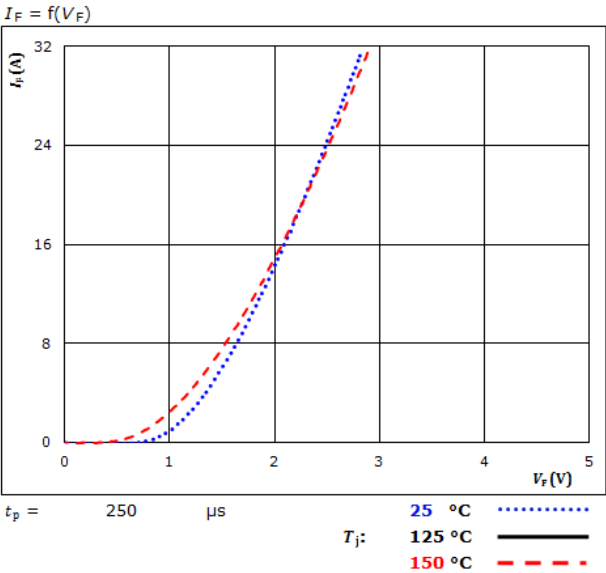
IGBT



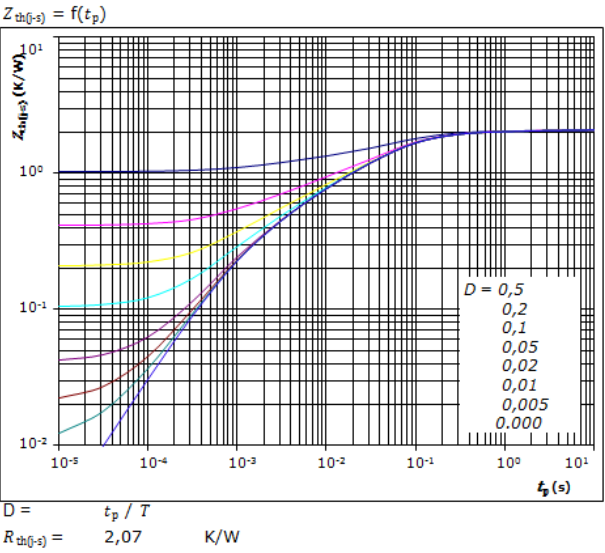


Inverter Diode\ Brake Diode Characteristics

Typical forward characteristics FWD



Transient thermal impedance as a function of pulse width FWD



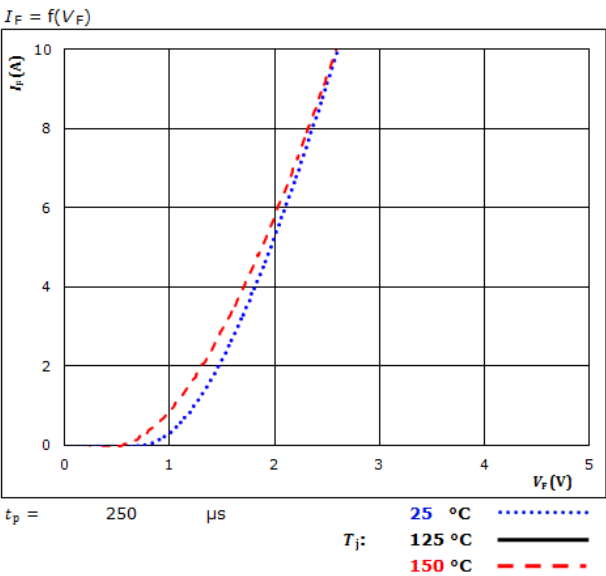
FWD thermal model values

R (K/W)	τ (s)
5,09E-02	4,26E+00
1,55E-01	5,03E-01
7,75E-01	7,89E-02
5,33E-01	2,68E-02
3,54E-01	5,03E-03
1,97E-01	9,09E-04

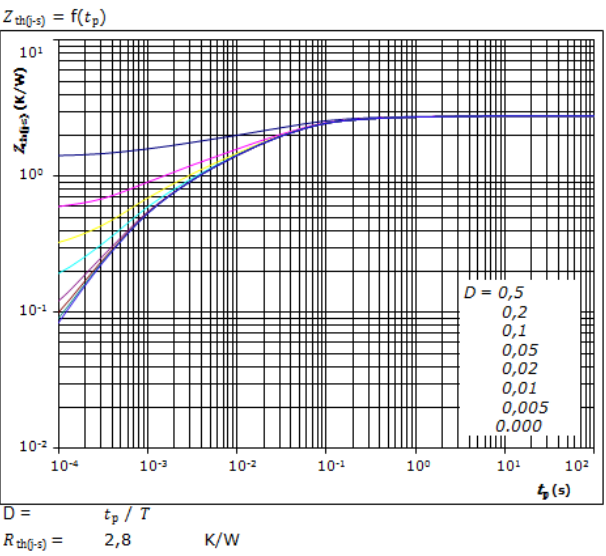


Brake Inverse Diode Characteristics

Typical forward characteristics FWD



Transient thermal impedance as a function of pulse width FWD

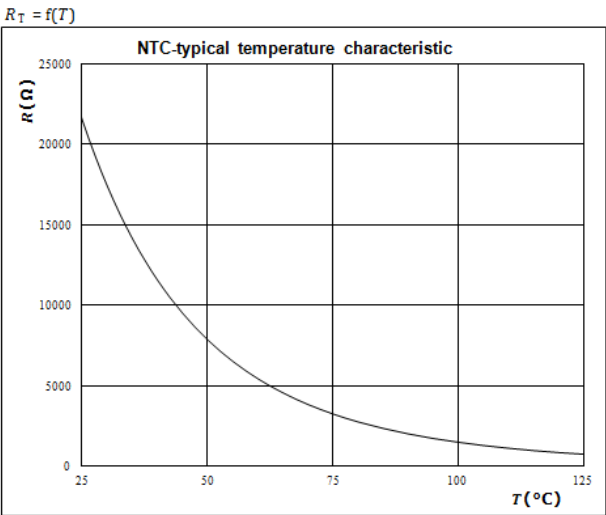


FWD thermal model values

R (K/W)	τ (s)
7.82E-02	2.45E+00
1.95E-01	2.65E-01
9.84E-01	4.77E-02
6.58E-01	1.23E-02
5.09E-01	2.70E-03
3.71E-01	5.98E-04

Thermistor Characteristics

Thermistor typical temperature characteristic
 Typical NTC characteristic
 as a function of temperature



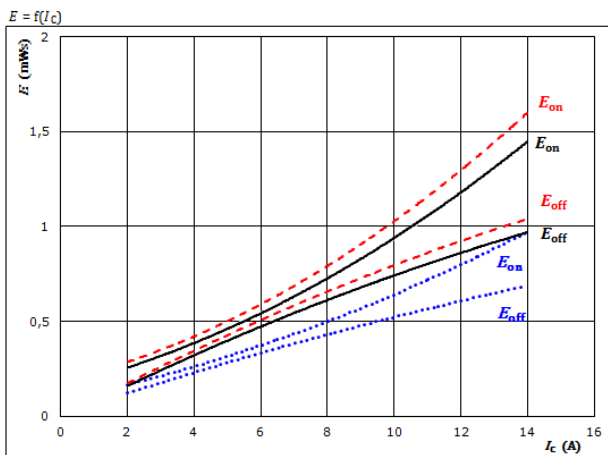


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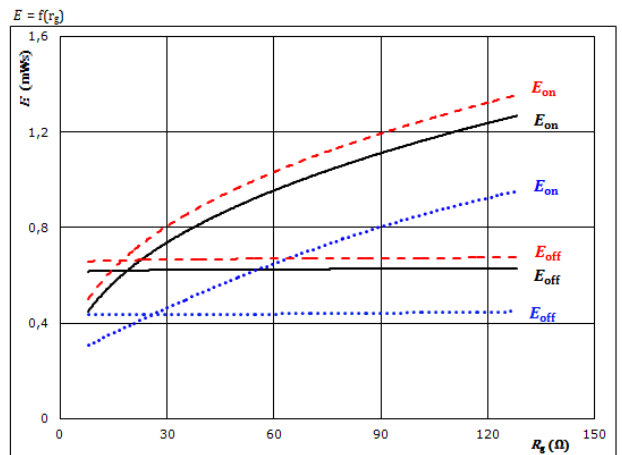
Inverter\ Brake Switching Characteristics

Figure 1. IGBT
Typical switching energy losses as a function of collector current



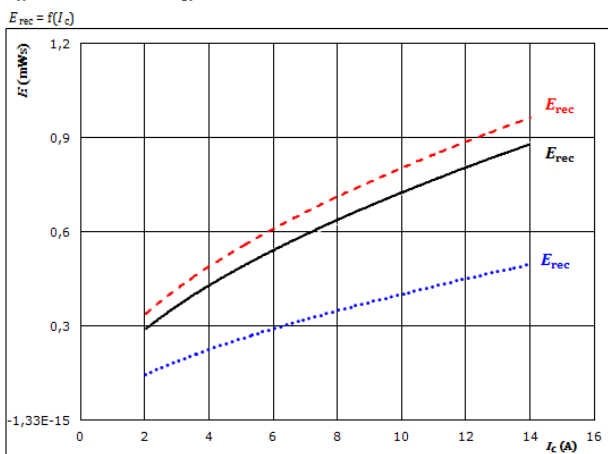
With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 32$ Ω
 $R_{goff} = 32$ Ω
 T_j : 25 °C
125 °C ———
150 °C - - - -

Figure 2. IGBT
Typical switching energy losses as a function of gate resistor



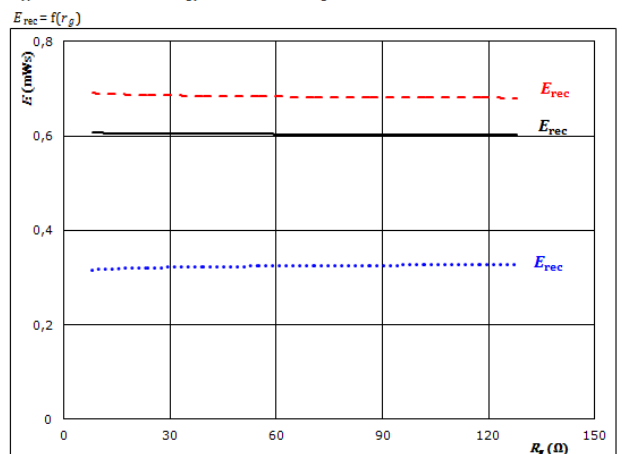
With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 8$ A
 T_j : 25 °C
125 °C ———
150 °C - - - -

Figure 3. FWD
Typical reverse recovered energy loss as a function of collector current



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 32$ Ω
 T_j : 25 °C
125 °C ———
150 °C - - - -

Figure 4. FWD
Typical reverse recovered energy loss as a function of gate resistor



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 8$ A
 T_j : 25 °C
125 °C ———
150 °C - - - -



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datasheet

Inverter\ Brake Switching Characteristics

Figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$

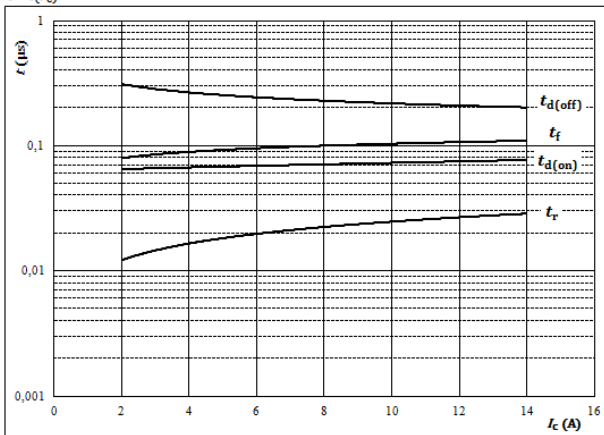


Figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$

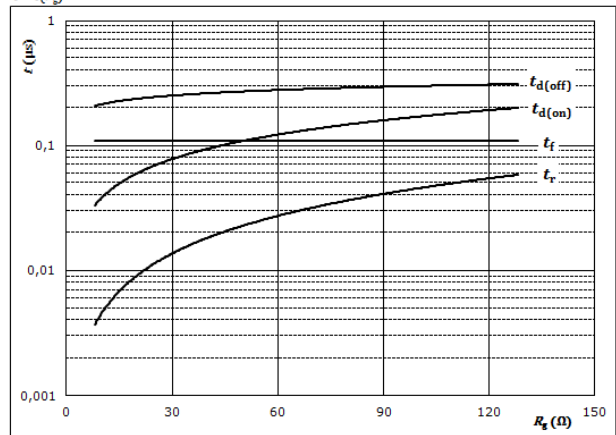


Figure 7. FWD

Typical reverse recovery time as a function of collector current

$$t_{rr} = f(I_C)$$

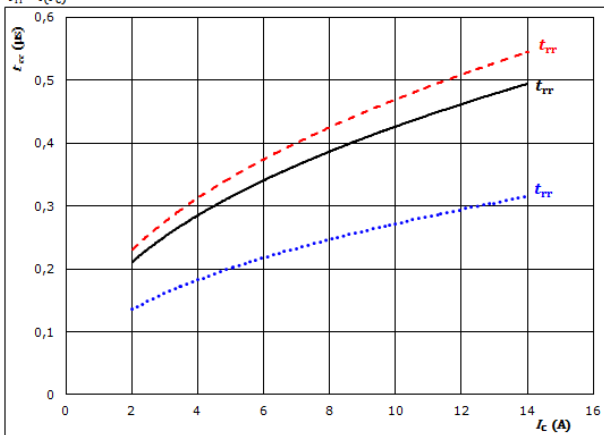
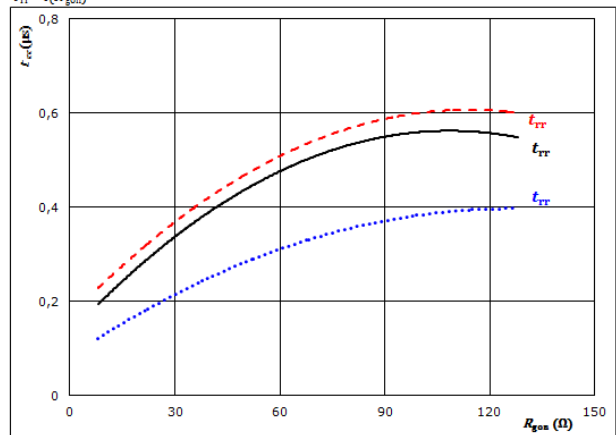


Figure 8. FWD

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

$$t_{rr} = f(R_{gon})$$





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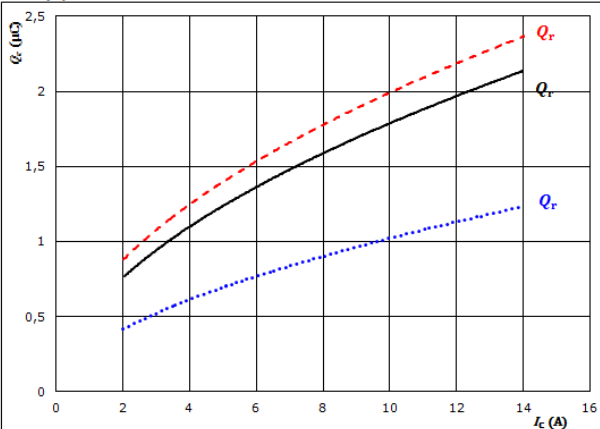
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Inverter\ Brake Switching Characteristics

Figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_C)$$

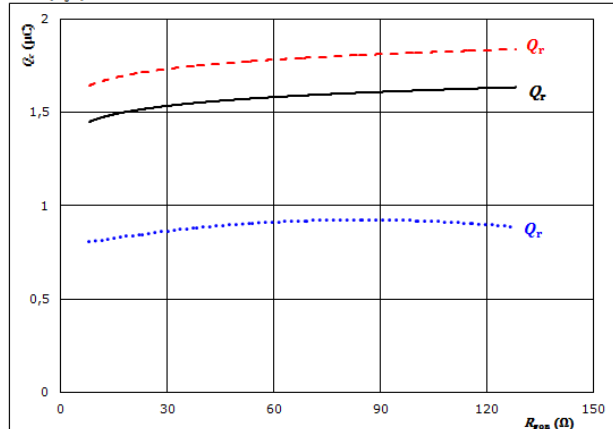


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 32$ Ω
 T_j : 25 °C
125 °C ———
150 °C - - - - -

Figure 10. FWD

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

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

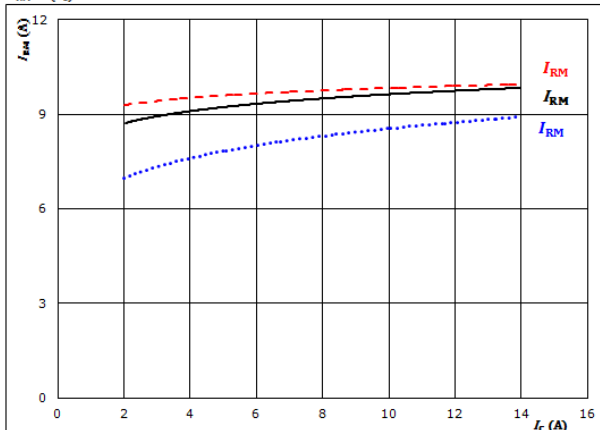


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 8$ A
 T_j : 25 °C
125 °C ———
150 °C - - - - -

Figure 11. FWD

Typical peak reverse recovery current as a function of collector current

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

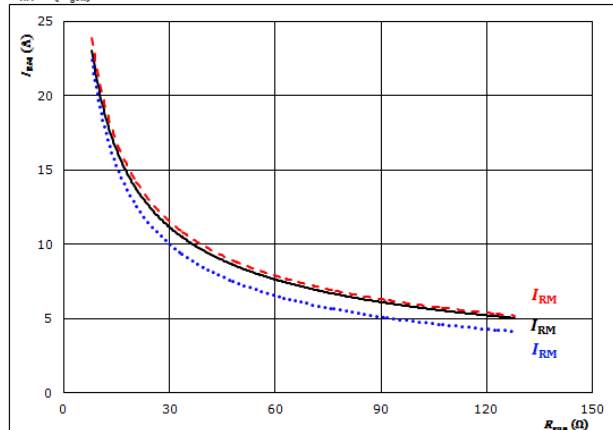


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 32$ Ω
 T_j : 25 °C
125 °C ———
150 °C - - - - -

Figure 12. FWD

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

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



At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 8$ A
 T_j : 25 °C
125 °C ———
150 °C - - - - -



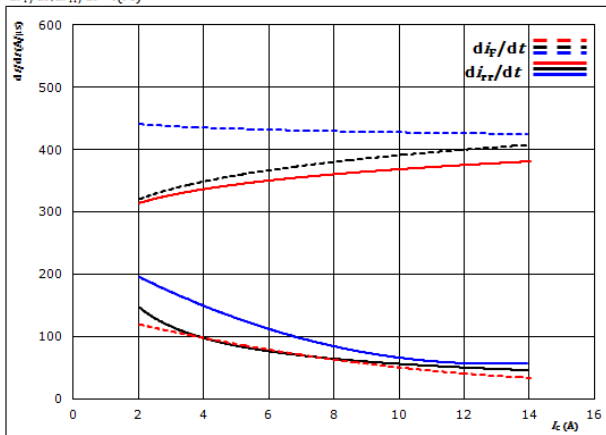
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datasheet

Inverter\ Brake Switching Characteristics

Figure 13. FWD

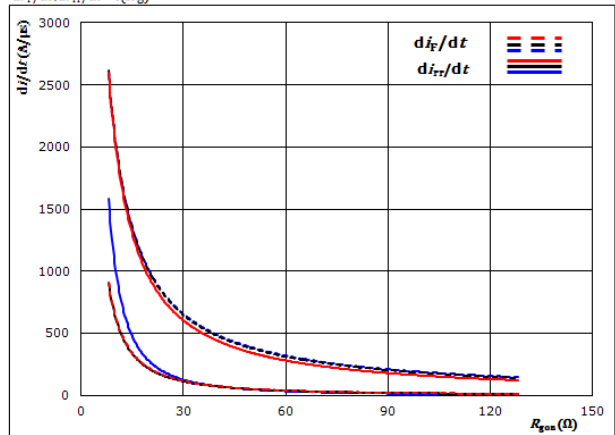
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_{rr}/dt = f(I_c)$



At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 32$ Ω
 $T_j = 25$ °C
 125 °C
 150 °C

Figure 14. FWD

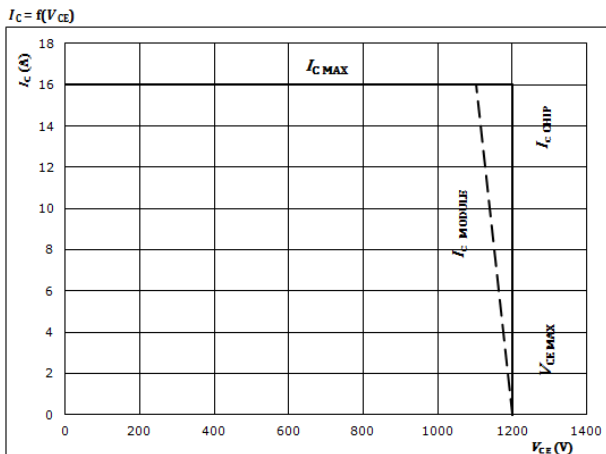
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
 $di_f/dt, di_{rr}/dt = f(R_g)$



At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 8$ A

Figure 15. IGBT

Reverse bias safe operating area



At $T_j = 175$ °C
 $R_{gon} = 32$ Ω
 $R_{goff} = 32$ Ω



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Inverter\ Brake Switching Definitions

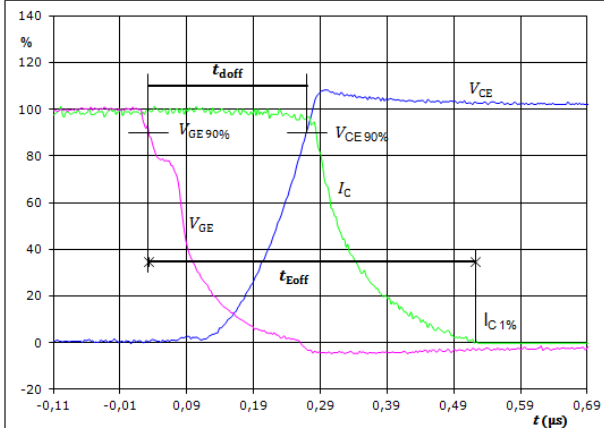
General conditions

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

Figure 1.

IGBT

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

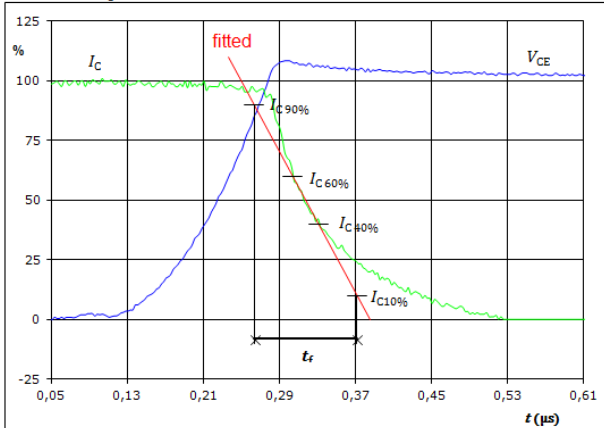


$V_{GE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	600	V
$I_C(100\%) =$	8	A
$t_{doff} =$	0,236	μs
$t_{Eoff} =$	0,490	μs

Figure 3.

IGBT

Turn-off Switching Waveforms & definition of t_f

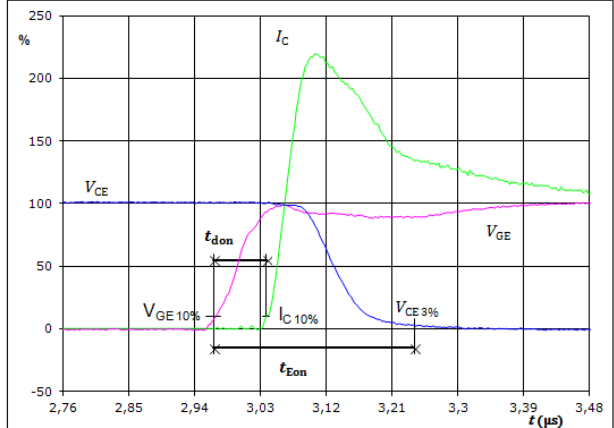


$V_C(100\%) =$	600	V
$I_C(100\%) =$	8	A
$t_f =$	0,108	μs

Figure 2.

IGBT

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

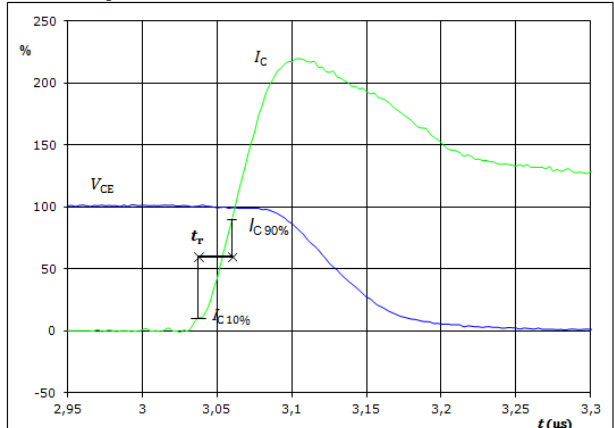


$V_{GE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	600	V
$I_C(100\%) =$	8	A
$t_{don} =$	0,071	μs
$t_{Eon} =$	0,275	μs

Figure 4.

IGBT

Turn-on Switching Waveforms & definition of t_r



$V_C(100\%) =$	600	V
$I_C(100\%) =$	8	A
$t_r =$	0,023	μs



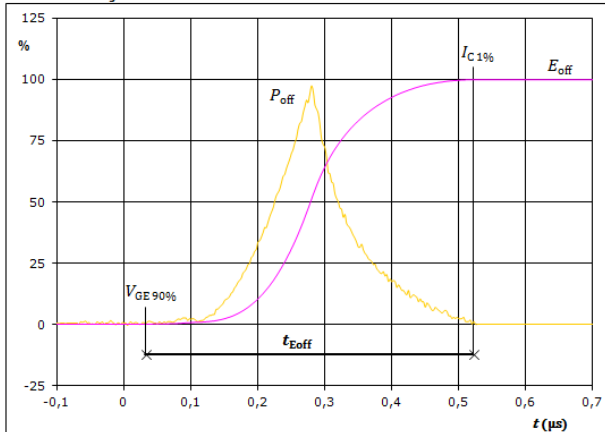
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 datasheet

Inverter\ Brake Switching Definitions

Figure 5. IGBT

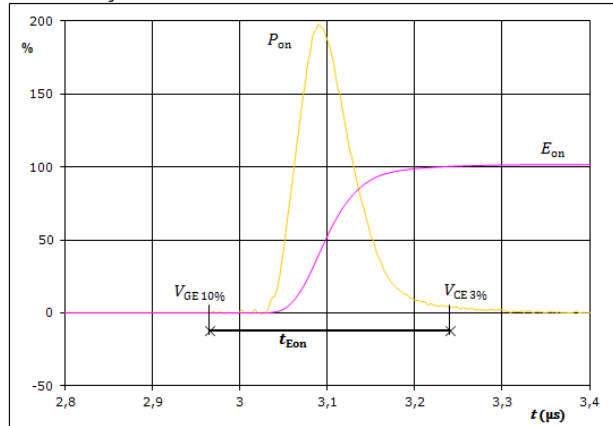
Turn-off Switching Waveforms & definition of t_{Eoff}



$P_{off}(100\%) = 4,93$ kW
 $E_{off}(100\%) = 0,62$ mJ
 $t_{Eoff} = 0,49$ μs

Figure 6. IGBT

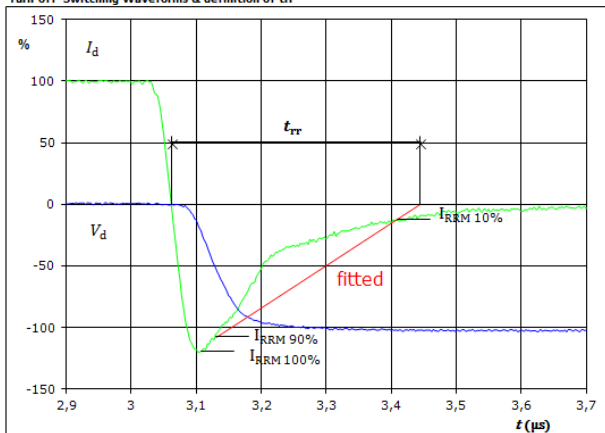
Turn-on Switching Waveforms & definition of t_{Eon}



$P_{on}(100\%) = 4,93$ kW
 $E_{on}(100\%) = 0,75$ mJ
 $t_{Eon} = 0,27$ μs

Figure 7. FWD

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



$V_d(100\%) = 600$ V
 $I_d(100\%) = 8$ A
 $I_{RRM}(100\%) = -10$ A
 $t_{rr} = 0,383$ μs



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 10-FZ127PA008SC-L156E08
 datasheet

Inverter\ Brake Switching Definitions

Figure 8. Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_d) FWD

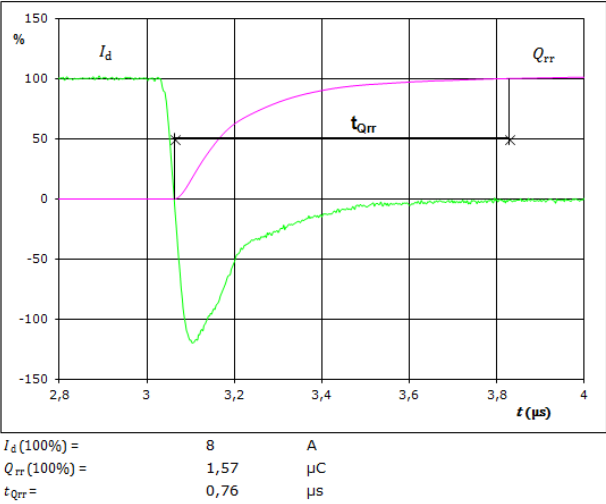
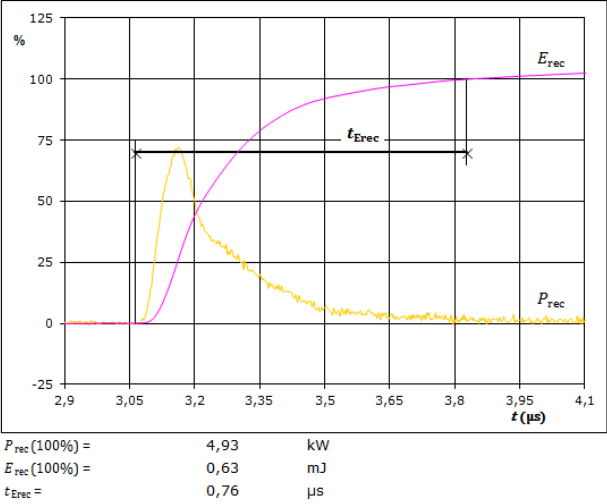


Figure 9. Turn-on Switching Waveforms & definition of t_{Erec} (t_{Erec} = integrating time for E_{rec}) FWD

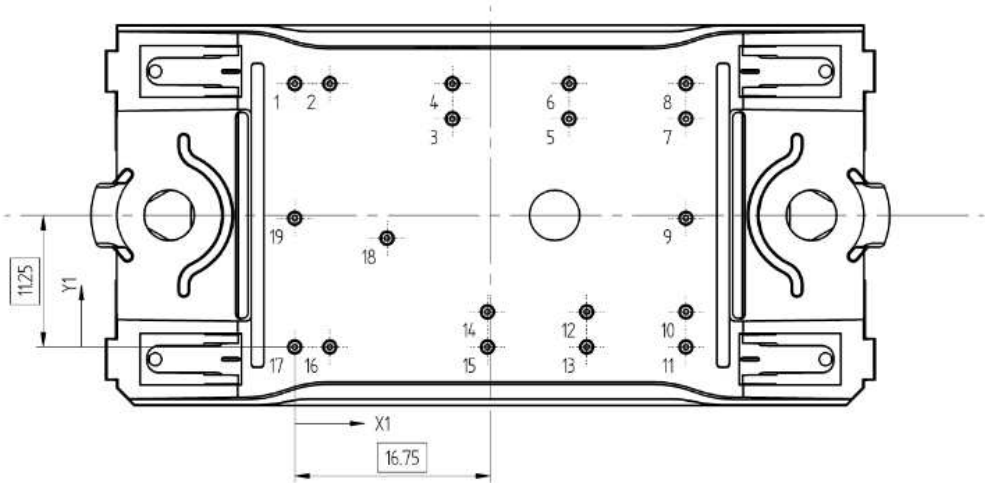




Vincotech

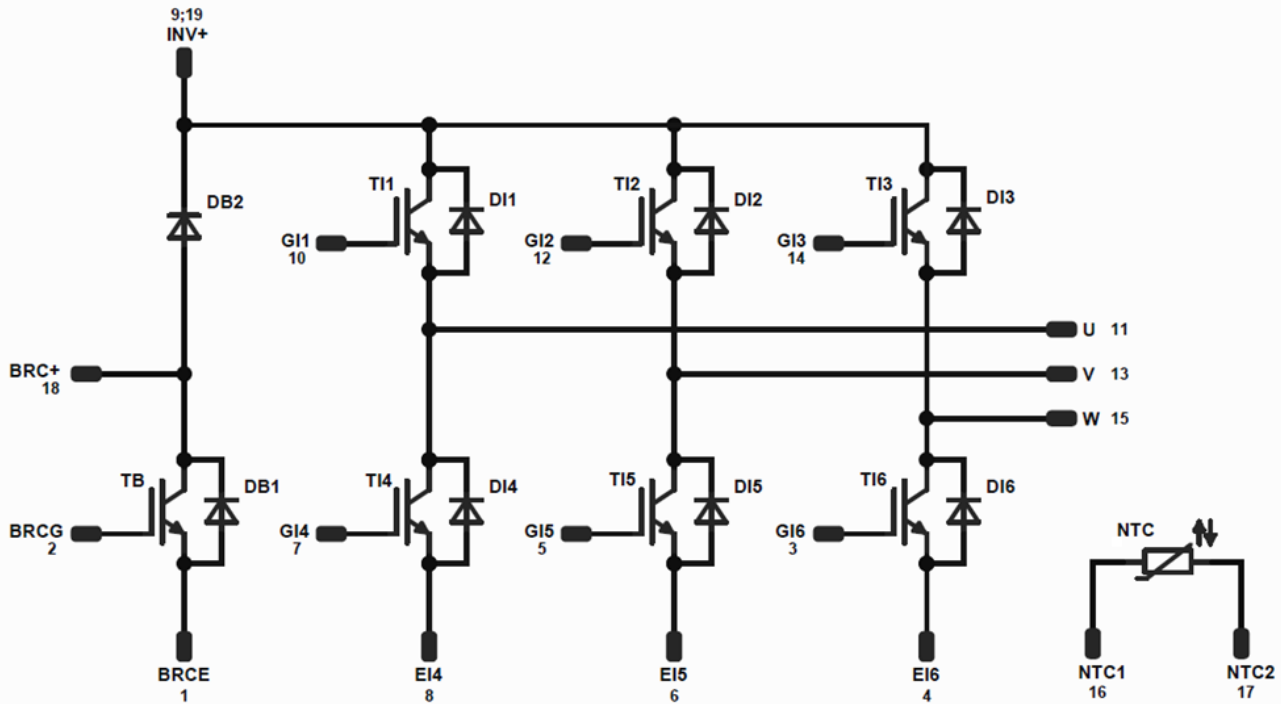
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10-FZ127PA008SC-L156E08
datasheet

Ordering Code & Marking							
Version	Ordering Code		in DataMatrix as		in packaging barcode as		
without thermal paste with 17mm housing	10-F0127PA0008SC-L156E09		L156E09		L156E09		
without thermal paste with 12mm housing	10-FZ127PA0008SC-L156E08		L156E08		L156E08		
NN-NNNNNNNNNNNNNN NNNNNNNN WWYY UL Venco LLLLL SSSS 	Text	Name		Date code	UL & Vinco	Lot	Serial
		NN-NNNNNNNNNNNNNN-NNNNNNNN		WWYY	UL Vinco	LLLLL	SSSS
	Datamatrix	Type&Ver	Lot number	Serial	Date code		
		TTTTTTTV	LLLLL	SSSS	WWYY		

Pin table [mm]				Outline	
Pin	X	Y	Function		
1	0	22,5	BRCE		
2	3	22,5	BRCG		
3	13,5	19,5	GI6		
4	13,5	22,5	EI6		
5	23,5	19,5	GI5		
6	23,5	22,5	EI5		
7	33,5	19,5	GI4		
8	33,5	22,5	EI4		
9	33,5	11	INV+		
10	33,5	3	GI1		
11	33,5	0	U		
12	25	3	GI2		
13	25	0	V		
14	16,5	3	GI3		
15	16,5	0	W		
16	3	0	NTC1		
17	0	0	NTC2		
18	7,9	9,3	BRC+		
19	0	11	INV+		



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
TI1, TI2, TI3 TI4, TI5, TI6	IGBT	1200V	8A	Inverter Switch	
DI1, DI2, DI3 DI4, DI5, DI6	FWD	1200V	10A	Inverter Diode	
TB	IGBT	1200V	8A	Brake Switch	
DB2	FWD	1200V	10A	Brake Diode	
DB1	FWD	1200V	3A	Brake Inverse Diode	
NTC	NTC	-	-	Thermistor	



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.			

Document No.:	Date:	Modification:	Pages
10-Fx127PA0008SC-L156E0x-D4-14	23 Jul. 2015	New outline drawing	16

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