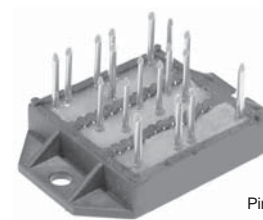
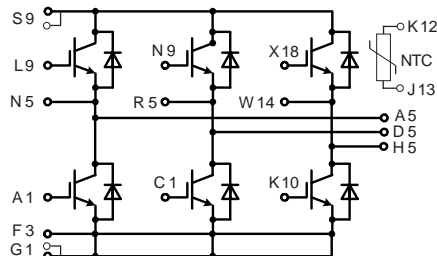


IGBT Module

Sixpack in ECO-PAC 2

$I_{C25} = 31 \text{ A}$
 $V_{CES} = 600 \text{ V}$
 $V_{CE(sat) \text{ typ.}} = 1.9 \text{ V}$

Preliminary data



Pin arrangement see outlines

IGBTs		
Symbol	Conditions	Maximum Ratings
V_{CES}	$T_{VJ} = 25^{\circ}\text{C to } 150^{\circ}\text{C}$	600 V
V_{GES}		± 20 V
I_{C25}	$T_C = 25^{\circ}\text{C}$	31 A
I_{C80}	$T_C = 80^{\circ}\text{C}$	21 A
I_{CM} V_{CEK}	$V_{GE} = \pm 15 \text{ V}; R_G = 47 \Omega; T_{VJ} = 125^{\circ}\text{C}$ RBSOA, Clamped inductive load; $L = 100 \mu\text{H}$	40 A
t_{SC} (SCSOA)		$V_{CE} = 600 \text{ V}; V_{GE} = \pm 15 \text{ V}; R_G = 47 \Omega; T_{VJ} = 125^{\circ}\text{C}$ non-repetitive
P_{tot}	$T_C = 25^{\circ}\text{C}$	100 W

Features

- NPT IGBT's
 - positive temperature coefficient of saturation voltage
 - fast switching
- FRED diodes
 - fast reverse recovery
 - low forward voltage
- Industry Standard Package
 - solderable pins for PCB mounting
 - isolated DCB ceramic base plate

Typical Applications

- AC drives
- power supplies with power factor correction

Symbol	Conditions	Characteristic Values ($T_{VJ} = 25^{\circ}\text{C}$, unless otherwise specified)			
		min.	typ.	max.	
$V_{CE(sat)}$	$I_C = 20 \text{ A}; V_{GE} = 15 \text{ V}; T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		1.9 2.2	V V	
$V_{GE(th)}$	$I_C = 0.5 \text{ mA}; V_{GE} = V_{CE}$	4.5		6.5 V	
I_{CES}	$V_{CE} = V_{CES}; V_{GE} = 0 \text{ V}; T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		0.7	0.6 mA mA	
I_{GES}	$V_{CE} = 0 \text{ V}; V_{GE} = \pm 20 \text{ V}$			100 nA	
$t_{d(on)}$ t_r $t_{d(off)}$ t_f E_{on} E_{off}	Inductive load, $T_{VJ} = 125^{\circ}\text{C}$ $V_{CE} = 300 \text{ V}; I_C = 10 \text{ A}$ $V_{GE} = \pm 15 \text{ V}; R_G = 82 \Omega$		50 55 300 30	ns ns ns ns	
				0.9 0.7	mJ mJ
C_{ies}		$V_{CE} = 25 \text{ V}; V_{GE} = 0 \text{ V}; f = 1 \text{ MHz}$		1100	pF
Q_{Gon}		$V_{CE} = 300 \text{ V}; V_{GE} = 15 \text{ V}; I_C = 20 \text{ A}$		65	nC
R_{thJC}		(per IGBT)			1.3 KW
R_{thJH}		with heatsink compound (0.42 K/m.K; 50 μm)		2.5	KW

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Diodes

Symbol	Conditions	Maximum Ratings	
I_{F25}	$T_C = 25^\circ\text{C}$	35	A
I_{F80}	$T_C = 80^\circ\text{C}$	22	A

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
V_F	$I_F = 20\text{ A}; T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$	1.9	2.1	V
I_{RM}	$I_F = 15\text{ A}; di_F/dt = -400\text{ A}/\mu\text{s}; T_{VJ} = 125^\circ\text{C}$ $V_R = 300\text{ V}; V_{GE} = 0\text{ V}$		13	A
t_{rr}			90	ns
R_{thJC} R_{thJH}	with heatsink compound (0.42 K/m.K; 50 μm)	4.6	2.3	K/W K/W

Data according to IEC 60747 and refer to a single diode unless otherwise stated.

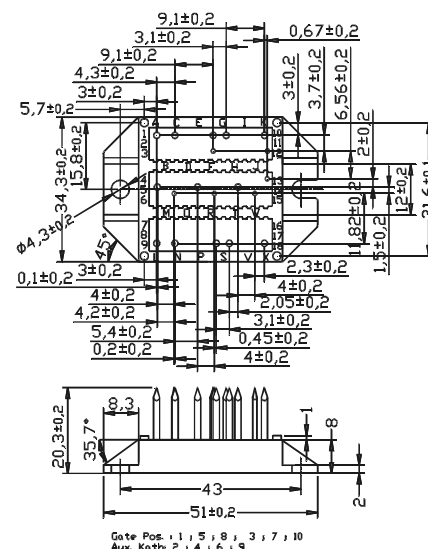
Temperature Sensor NTC

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
R_{25}	$T = 25^\circ\text{C}$	4.75	5.0	k Ω
$B_{25/50}$			3375	K

Component

Symbol	Conditions	Maximum Ratings	
T_{VJ}		-40...+150	$^\circ\text{C}$
T_{stg}		-40...+125	$^\circ\text{C}$
V_{ISOL}	$I_{ISOL} \leq 1\text{ mA}; 50/60\text{ Hz}; t = 1\text{ s}$	3600	V~
M_d	mounting torque (M4)	1.5 - 2.0	Nm 14 - 18 lb.in.
a	Max. allowable acceleration	50	m/s^2

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
d_s	Creepage distance on surface (Pin to heatsink)	11.2		mm
d_A	Strike distance in air (Pin to heatsink)	11.2		mm
Weight		24		g

Dimensions in mm (1 mm = 0.0394")


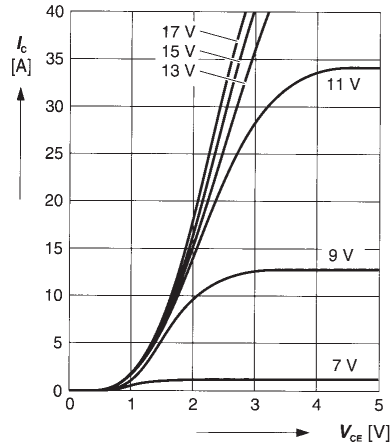
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IGBT

Typ. output characteristics

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

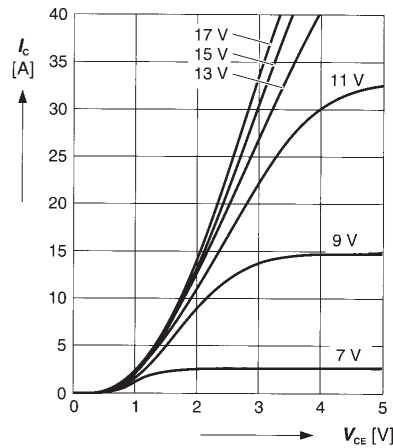
parameter: $t_p = 250 \mu s$; $T_j = 25^\circ C$



Typ. output characteristics

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

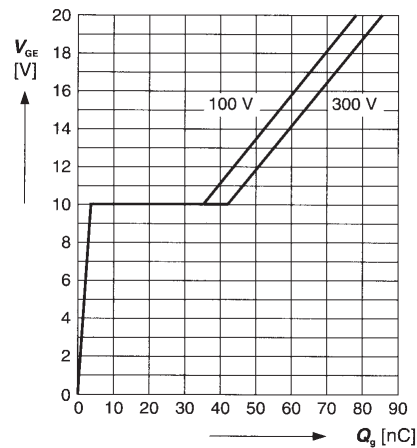
parameter: $t_p = 250 \mu s$; $T_j = 125^\circ C$



Typ. gate charge

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

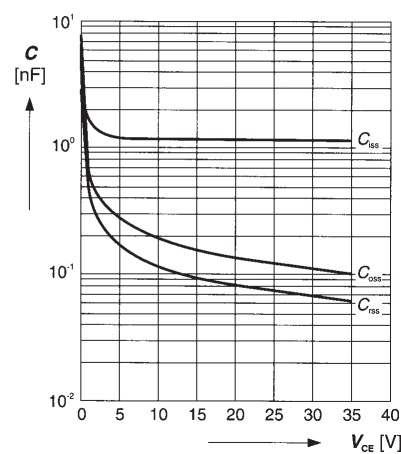
parameter: $I_{C,puls} = 20 A$



Typ. capacitances

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

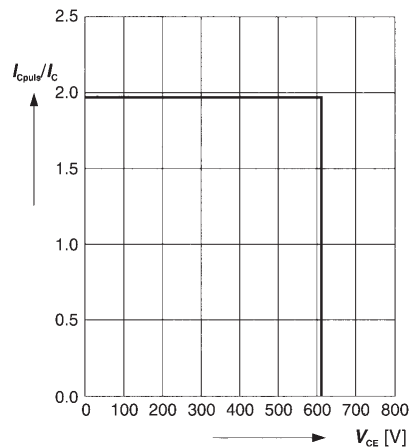
parameter: $V_{GE} = 0 V$; $f = 1 MHz$



Reverse biased safe operating area

$$I_{C,puls} = f(V_{CE}), T_j = 150^\circ C$$

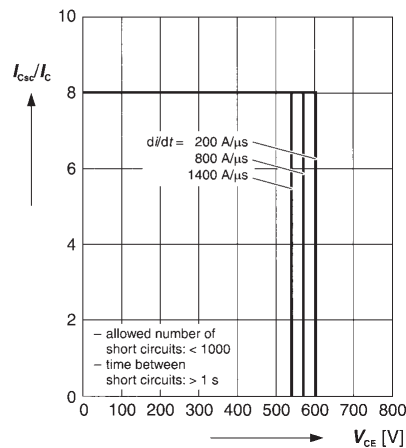
parameter: $V_{GE} = 15 V$



Short circuit safe operating area

$$I_{C,sc} = f(V_{CE}), T_j = 150^\circ C$$

parameter: $V_{GE} = \pm 15 V$; $t_{sc} \le 10 \mu s$; $L < 50 nH$

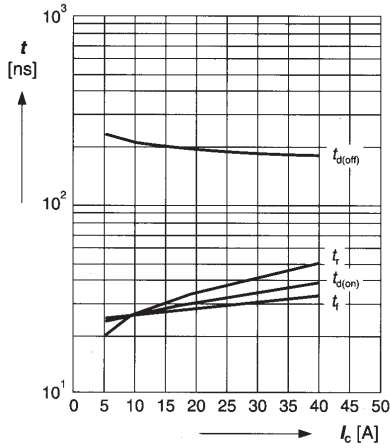


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IGBT

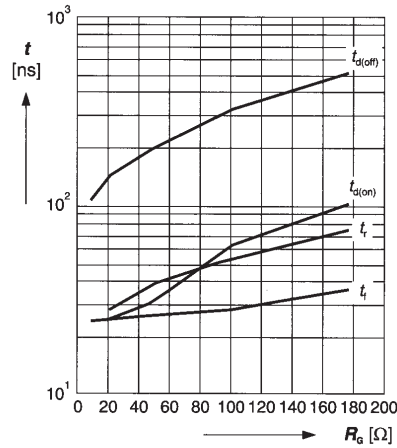
Typ. switching time

$t = f(I_C)$, inductive load, $T_j = 125^\circ\text{C}$
 parameter: $V_{CE} = 300\text{ V}$; $V_{GE} = \pm 15\text{ V}$; $R_G = 47\ \Omega$



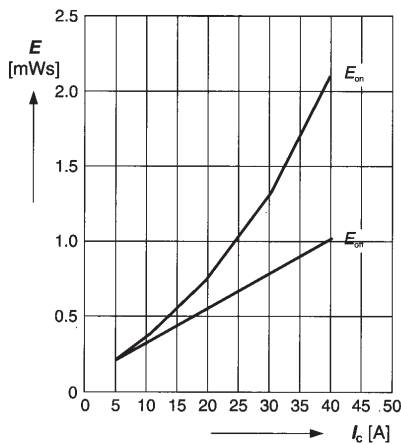
Typ. switching time

$t = f(R_G)$, inductive load, $T_j = 125^\circ\text{C}$
 parameter: $V_{CE} = 300\text{ V}$; $V_{GE} = \pm 15\text{ V}$; $I_C = 20\text{ A}$



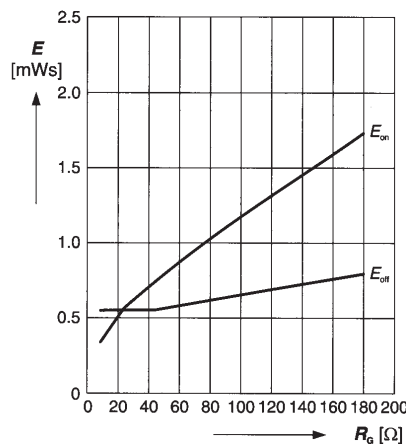
Typ. switching losses

$E = f(I_C)$, inductive load, $T_j = 125^\circ\text{C}$
 parameter: $V_{CE} = 300\text{ V}$; $V_{GE} = \pm 15\text{ V}$; $R_G = 47\ \Omega$

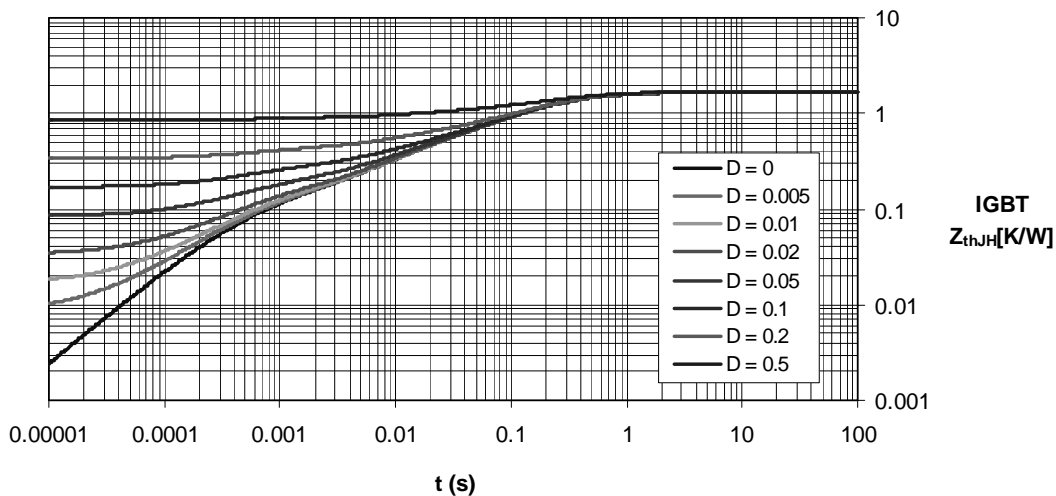


Typ. switching losses

$E = f(R_G)$, inductive load, $T_j = 125^\circ\text{C}$
 parameter: $V_{CE} = 300\text{ V}$; $V_{GE} = \pm 15\text{ V}$; $I_C = 20\text{ A}$

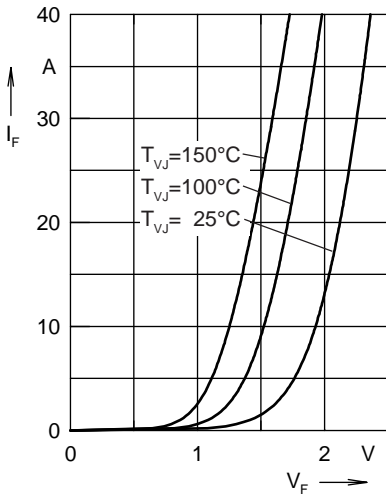


Transient thermal resistance junction to heatsink

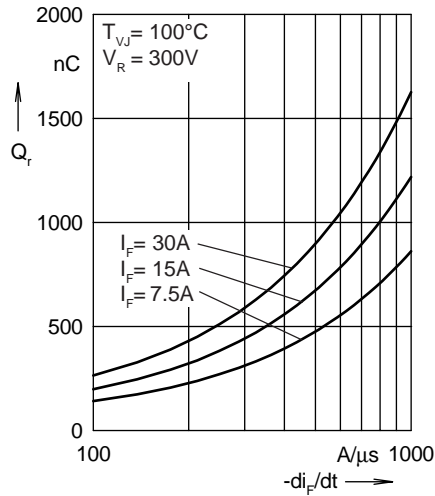


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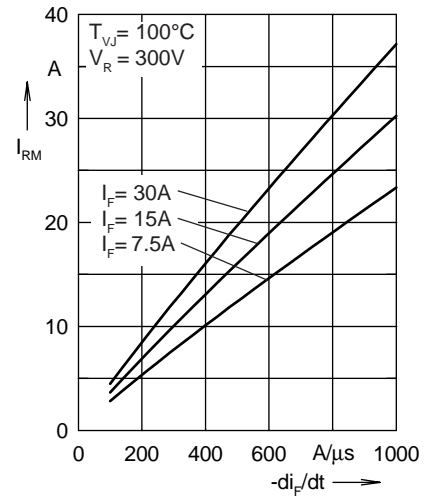
Diode



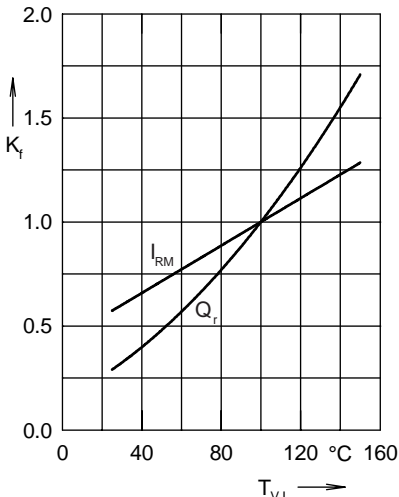
Forward current I_F versus V_F



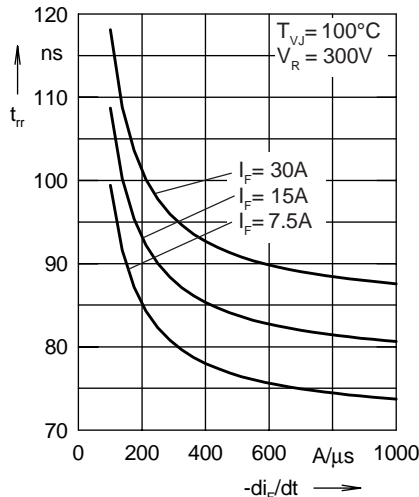
Reverse recovery charge Q_r versus $-di_F/dt$



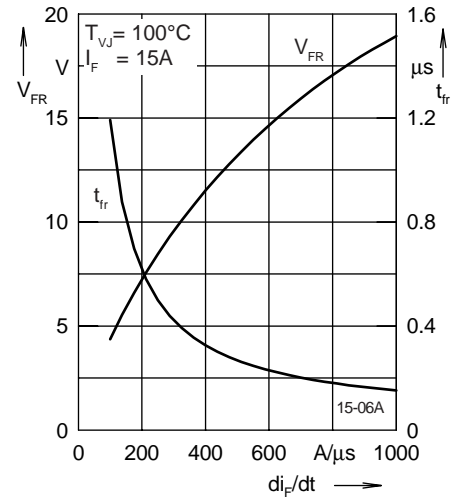
Peak reverse current I_{RM} versus $-di_F/dt$



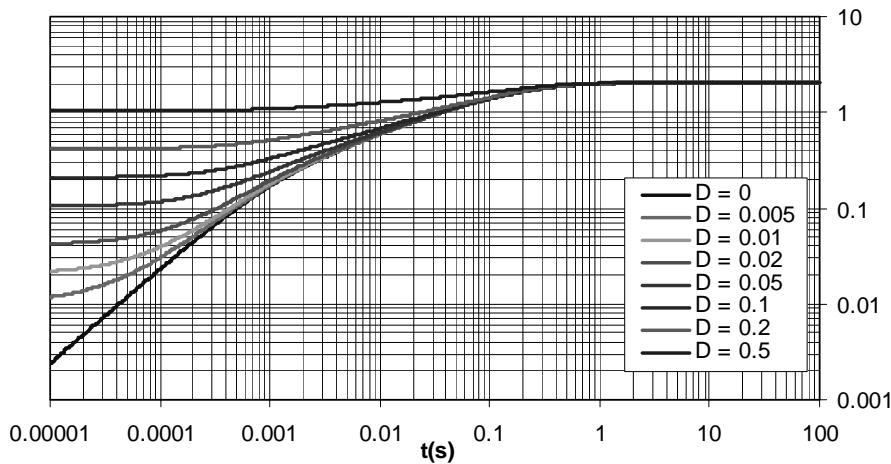
Dynamic parameters Q_r , I_{RM} versus T_{VJ}



Recovery time t_{rr} versus $-di_F/dt$



Peak forward voltage V_{FR} and t_{rr} versus di_F/dt



Transient thermal resistance junction to heatsink

FRED
 Z_{thJH} [K/W]

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