

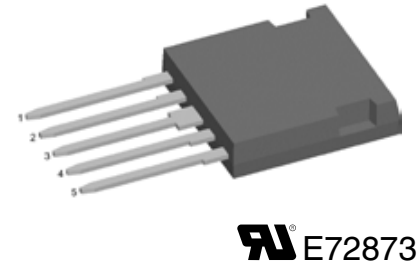
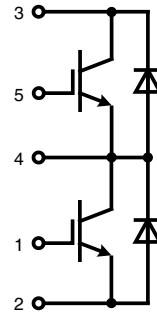
## IGBT phaseleg

in ISOPLUS i4-PAC™

$$I_{C25} = 30 \text{ A}$$

$$V_{CES} = 600 \text{ V}$$

$$V_{CE(sat) \text{ typ.}} = 1.9 \text{ V}$$



IGBT			
Symbol	Conditions	Maximum Ratings	
$V_{CES}$	$T_{VJ} = 25^{\circ}\text{C to } 150^{\circ}\text{C}$	600	V
$V_{GES}$		$\pm 20$	V
$I_{C25}$	$T_C = 25^{\circ}\text{C}$	30	A
$I_{C90}$	$T_C = 90^{\circ}\text{C}$	18	A
$I_{CM}$	$V_{GE} = \pm 15 \text{ V}; R_G = 47 \Omega; T_{VJ} = 125^{\circ}\text{C}$	40	A
$V_{CEK}$	<b>RBSOA</b> Clamped inductive load; $L = 100 \mu\text{H}$	$V_{CES}$	
$t_{SC}$ (SCSOA)	$V_{CE} = V_{CES}; V_{GE} = \pm 15 \text{ V}; R_G = 47 \Omega$ $T_{VJ} = 125^{\circ}\text{C}; \text{non-repetitive}$	10	$\mu\text{s}$
$P_{tot}$	$T_C = 25^{\circ}\text{C}$	100	W

Symbol	Conditions	Characteristic Values				
		$(T_{VJ} = 25^{\circ}\text{C}, \text{ unless otherwise specified})$				
		min.	typ.	max.		
$V_{CE(sat)}$	$I_C = 20 \text{ A}; V_{GE} = 15 \text{ V}$		1.9	2.4	V	
			2.2		V	
$V_{GE(th)}$	$I_C = 0.5 \text{ mA}; V_{GE} = V_{CE}$	4.5		6.5	V	
$I_{CES}$	$V_{CE} = V_{CES}; V_{GE} = 0 \text{ V}$		0.6	0.6	mA mA	
$I_{GES}$	$V_{CE} = 0 \text{ V}; V_{GE} = \pm 20 \text{ V}$			200	nA	
$t_{d(on)}$ $t_r$ $t_{d(off)}$ $t_f$ $E_{on}$ $E_{off}$	Inductive load $V_{CE} = 300 \text{ V}; I_C = 20 \text{ A}$ $V_{GE} = \pm 15 \text{ V}; R_G = 47 \Omega$ $T_{VJ} = 125^{\circ}\text{C}$		50		ns	
				55		ns
				200		ns
				30		ns
				0.75		mJ
				0.6		mJ
$C_{ies}$	$V_{CE} = 25 \text{ V}; V_{GE} = 0 \text{ V}; f = 1 \text{ MHz}$		1.1		nF	
$Q_{Gon}$	$V_{CE} = 300 \text{ V}; V_{GE} = 15 \text{ V}; I_C = 20 \text{ A}$		65		nC	
$R_{thJC}$ $R_{thJH}$	with heatsink compound		2.5	1.25	K/W K/W	

## Features

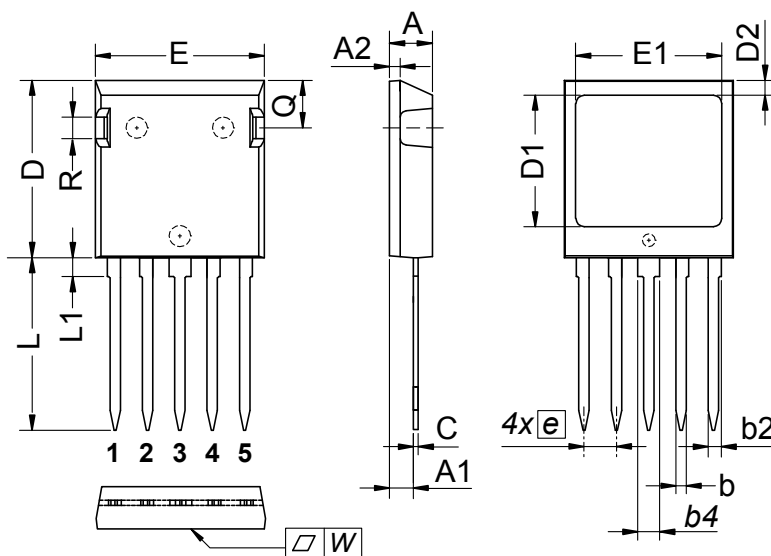
- NPT IGBT technology
  - low saturation voltage
  - positive temperature coefficient for easy paralleling
  - fast switching
- HiPerFRED™ diode
  - optimized fast and soft reverse recovery
  - low operating forward voltage
  - low leakage current
- ISOPLUS i4-PAC™ package
  - isolated back surface
  - low coupling capacity between pins and heatsink
  - enlarged creepage towards heatsink
  - application friendly pinout
  - low inductive current path
  - high reliability
  - industry standard outline
  - UL registered E 72873

## Applications

- single phaseleg
  - buck-boost chopper
- H bridge
  - power supplies
  - induction heating
  - four quadrant DC drives
  - controlled rectifier
- three phase bridge
  - AC drives
  - controlled rectifier

Diode						
Symbol	Conditions	Maximum Ratings				
$V_{RRM}$	$T_{VJ} = 25^{\circ}\text{C}$ to $150^{\circ}\text{C}$	600	V			
$I_{F25}$	$T_C = 25^{\circ}\text{C}$	30	A			
$I_{F90}$	$T_C = 90^{\circ}\text{C}$	15	A			
Symbol	Conditions	Characteristic Values				
		min.	typ.	max.		
$V_F$	$I_F = 20\text{ A}$		$T_{VJ} = 25^{\circ}\text{C}$	2.3	2.7	V
			$T_{VJ} = 125^{\circ}\text{C}$	1.6		V
$I_{RM}$	$I_F = 15\text{ A}; di_F/dt = -400\text{ A}/\mu\text{s};$ $V_R = 300\text{ V}; V_{GE} = 0\text{ V};$		$T_{VJ} = 125^{\circ}\text{C}$	7		A
$t_{rr}$				50		ns
$R_{thJC}$	(per diode)			2.3	K/W	
$R_{thJH}$	with heatsink compound		4.6	K/W		

Component						
Symbol	Conditions	Maximum Ratings				
$T_{VJ}$	operating	-55...+150	$^{\circ}\text{C}$			
$T_{stg}$		-55...+125	$^{\circ}\text{C}$			
$V_{ISOL}$	$I_{ISOL} \leq 1\text{ mA}; 50/60\text{ Hz}; t = 1\text{ s}$	2500	V~			
$F_C$	Mounting force with clip	20...120	Nm			
Symbol	Conditions	Characteristic Values				
		min.	typ.	max.		
$C_p$	coupling capacity between shorted pins and mounting tab in the case		40		pF	
$d_S, d_A$	pin - pin	1.7			mm	
$d_S, d_A$	pin - backside metal	5.5			mm	
Weight			6	g		



DIM.	MILLIMETER		INCHES	
	MIN	MAX	MIN	MAX
A	4.83	5.21	0.190	0.205
A1	2.59	3.00	0.102	0.118
A2	1.17	2.16	0.046	0.085
b	1.14	1.40	0.045	0.055
b2	1.47	1.73	0.058	0.068
b4	2.54	2.79	0.100	0.110
C	0.51	0.74	0.020	0.029
D	20.80	21.34	0.819	0.840
D1	14.99	15.75	0.590	0.620
D2	1.65	2.03	0.065	0.080
E	19.56	20.29	0.770	0.799
E1	16.76	17.53	0.660	0.690
e	3.81 BSC		0.15 BSC	
L	19.81	21.34	0.780	0.840
L1	2.11	2.59	0.083	0.102
Q	5.33	6.20	0.210	0.244
R	2.54	4.57	0.100	0.180
W	—	0.10	—	0.004

Die konvexe Form des Substrates ist typ. < 0.05 mm über der Kunststoffoberfläche der Bauteilunterseite  
The convex bow of substrate is typ. < 0.05 mm over plastic surface level of device bottom side

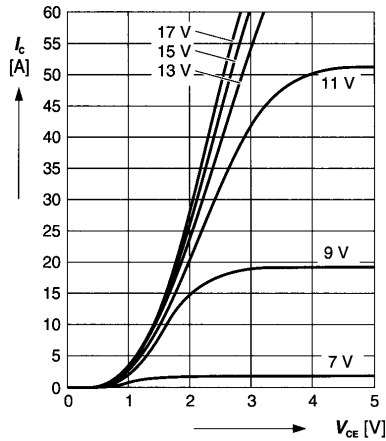
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### Typ. output characteristics

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

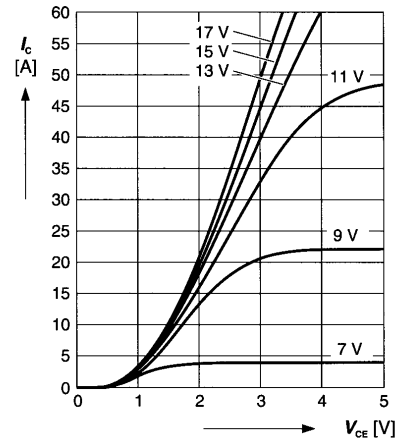
parameter:  $t_p = 250 \mu s$ ;  $T_j = 25^\circ C$



### Typ. output characteristics

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

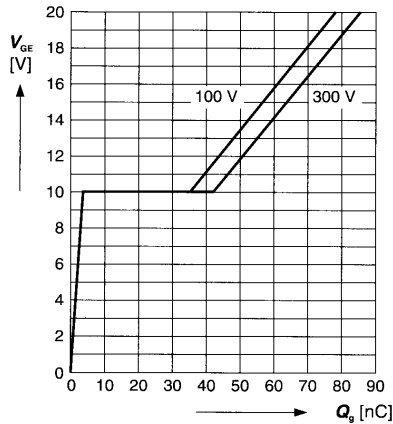
parameter:  $t_p = 250 \mu s$ ;  $T_j = 125^\circ C$



### Typ. gate charge

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

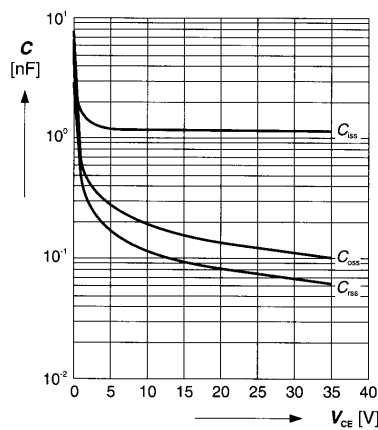
parameter:  $I_{C\ puls} = 20\ A$



### Typ. capacitances

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

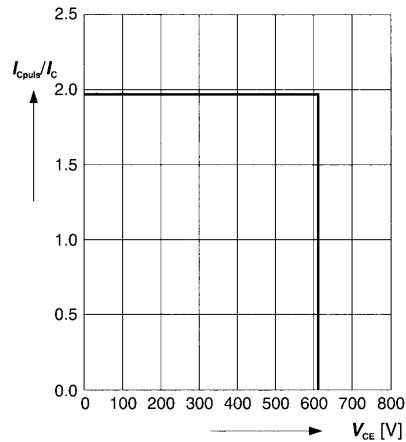
parameter:  $V_{GE} = 0\ V$ ;  $f = 1\ MHz$



### Reverse biased safe operating area

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

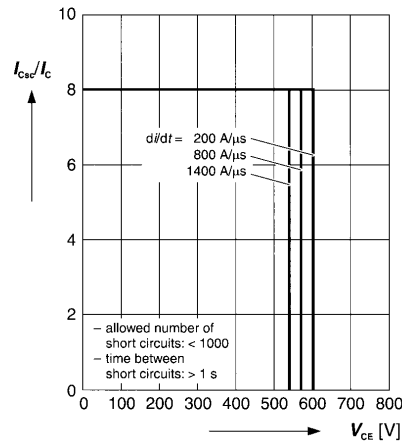
parameter:  $V_{GE} = 15\ V$



### Short circuit safe operating area

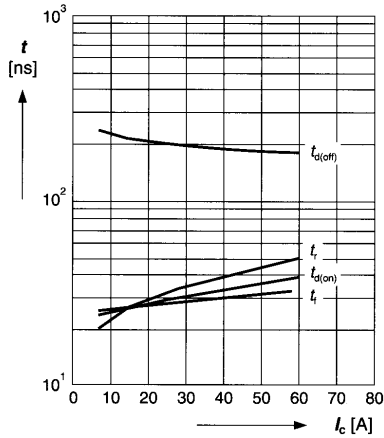
$$I_{C\ SC} = f(V_{CE}), T_j = 150^\circ C$$

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



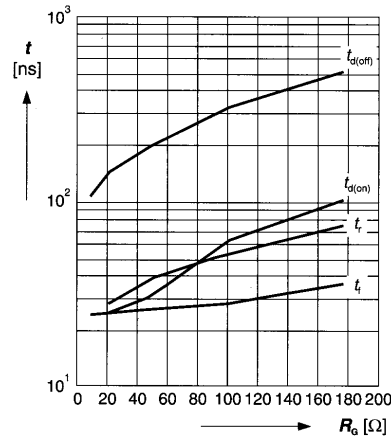
**Typ. switching time**

$t = f(I_C)$ , inductive load,  $T_j = 125^\circ\text{C}$   
 parameter:  $V_{CE} = 300\text{ V}$ ;  $V_{GE} = \pm 15\text{ V}$ ;  $R_G = 33\ \Omega$



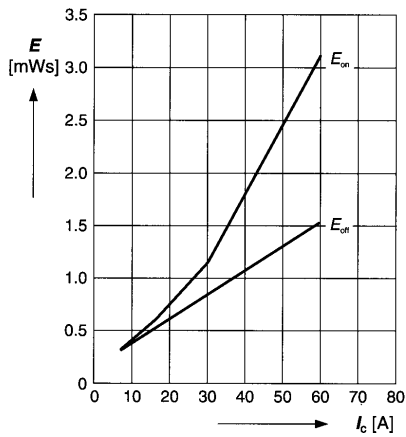
**Typ. switching time**

$t = f(R_G)$ , inductive load,  $T_j = 125^\circ\text{C}$   
 parameter:  $V_{CE} = 300\text{ V}$ ;  $V_{GE} = \pm 15\text{ V}$ ;  $I_C = 30\text{ A}$



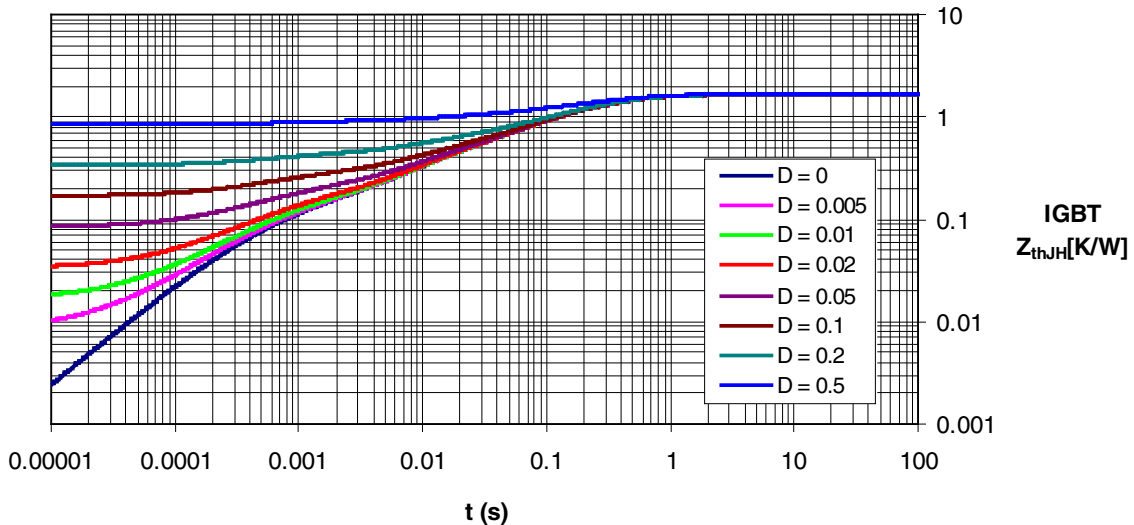
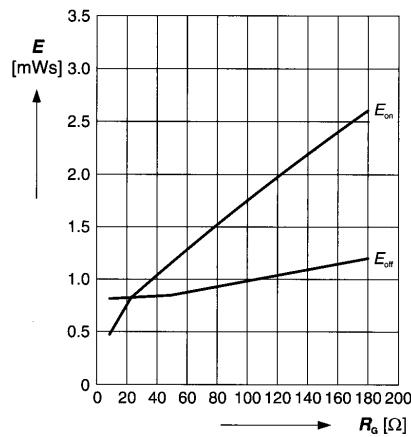
**Typ. switching losses**

$E = f(I_C)$ , inductive load,  $T_j = 125^\circ\text{C}$   
 parameter:  $V_{CE} = 300\text{ V}$ ;  $V_{GE} = \pm 15\text{ V}$ ;  $R_G = 33\ \Omega$



**Typ. switching losses**

$E = f(R_G)$ , inductive load,  $T_j = 125^\circ\text{C}$   
 parameter:  $V_{CE} = 300\text{ V}$ ;  $V_{GE} = \pm 15\text{ V}$ ;  $I_C = 30\text{ A}$



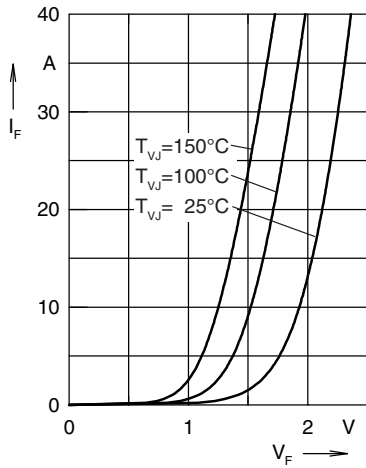
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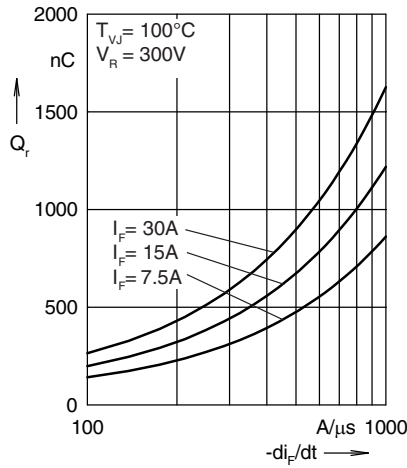
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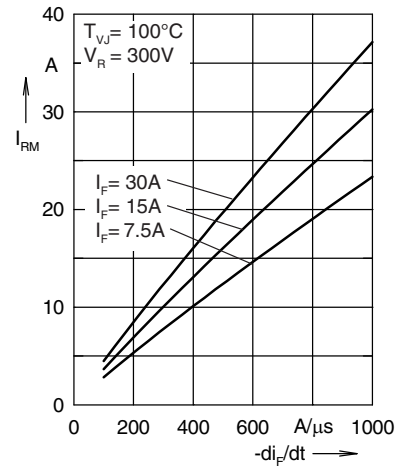
## Diode



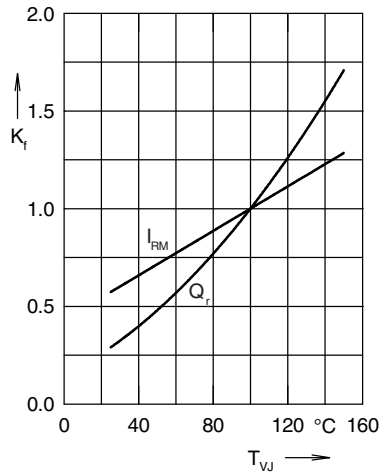
Forward current  $I_F$  versus  $V_F$



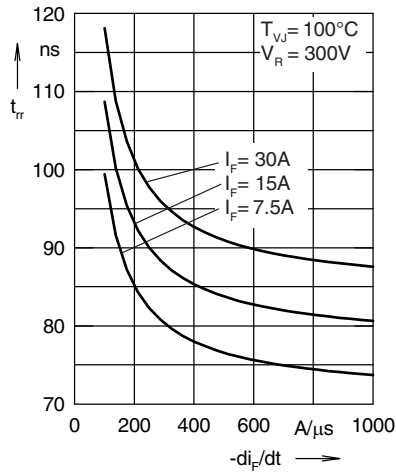
Reverse recovery charge  $Q_r$  versus  $-di_F/dt$



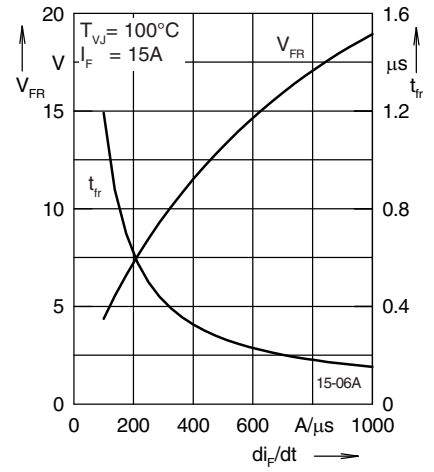
Peak reverse current  $I_{RM}$  versus  $-di_F/dt$



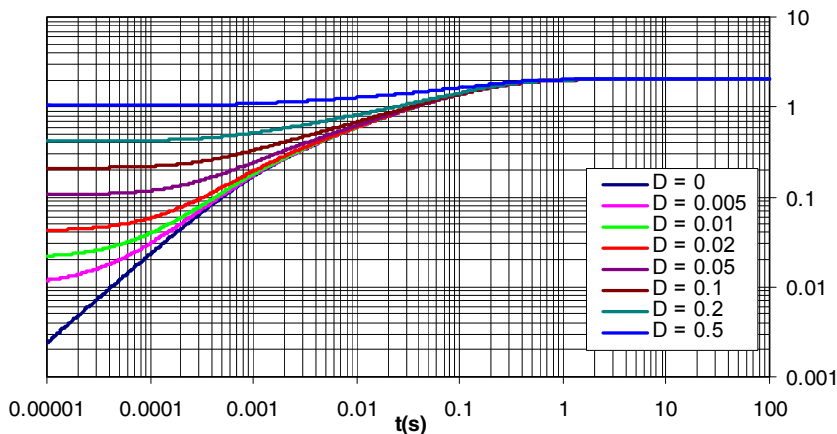
Dynamic parameters  $Q_r$ ,  $I_{RM}$  versus  $T_{VJ}$



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



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



Transient thermal resistance junction to heatsink

**FRED**  
 $Z_{thjH}$  [K/W]