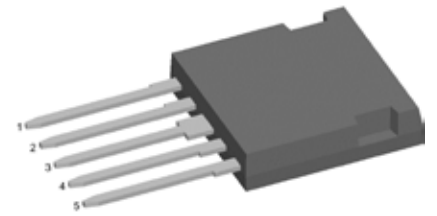
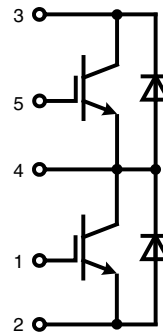


# IGBT phaseleg

in ISOPLUS i4-PAC™

 $I_{C25} = 30 \text{ A}$   
 $V_{CES} = 600 \text{ V}$   
 $V_{CE(sat) \text{ typ.}} = 1.9 \text{ V}$ 


E72873

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			
( $T_{VJ} = 25^{\circ}\text{C}$ , 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
$t_{d(on)}$	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
$t_r$			55		ns
$t_{d(off)}$			200		ns
$t_f$			30		ns
$E_{on}$			0.75		mJ
$E_{off}$			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
$R_{thJC}$				1.25	K/W
$R_{thJH}$	with heatsink compound		2.5		K/W

### Features

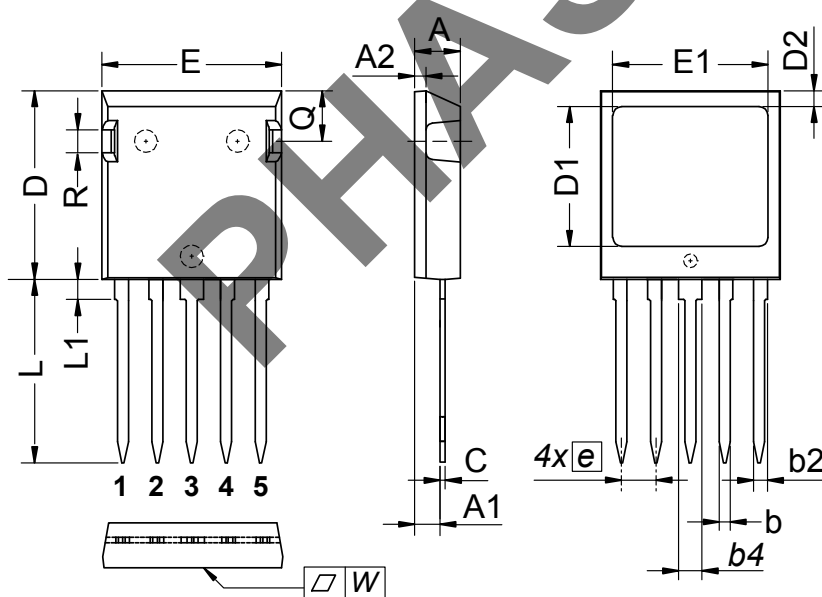
- NPT IGBT technology
- low saturation voltage
- positive temperature coefficient for easy paralleling
- fast switching
- HiPerFRED™ diode
- optimized fast and soft reverse recovery
- low operating forward voltage
- low leakage current
- ISOPLUS i4-PAC™ package
- isolated back surface
- low coupling 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
$I_{RM}$ $t_{rr}$	} $I_F = 15\text{ A}; di_F/dt = -400\text{ A}/\mu\text{s};$ $V_R = 300\text{ V}; V_{GE} = 0\text{ V};$	$T_{VJ} = 125^{\circ}\text{C}$		7		A
				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	°C		
$T_{stg}$			-55...+125	°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



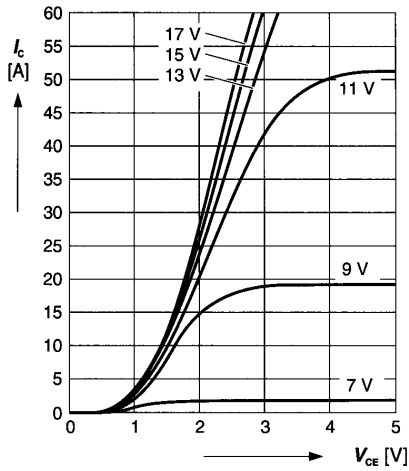
DIM.	MILLIMETER		INCHES	
	MIN	MAX	MIN	MAX
A	4.83	5.21	0.190	0.205
A1	2.59	3.00	0.102	0.118
A2	1.17	2.16	0.046	0.085
b	1.14	1.40	0.045	0.055
b2	1.47	1.73	0.058	0.068
b4	2.54	2.79	0.100	0.110
C	0.51	0.74	0.020	0.029
D	20.80	21.34	0.819	0.840
D1	14.99	15.75	0.590	0.620
D2	1.65	2.03	0.065	0.080
E	19.56	20.29	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

### Typ. output characteristics

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

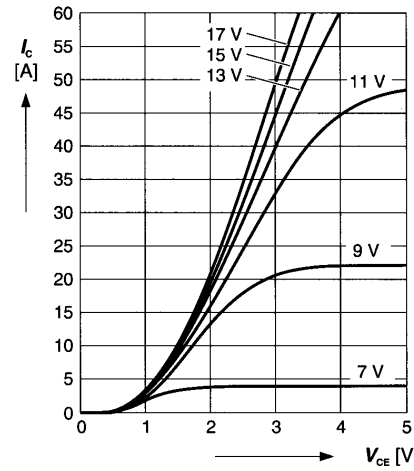
parameter:  $t_p = 250 \mu s$ ;  $T_j = 25^\circ C$



### Typ. output characteristics

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

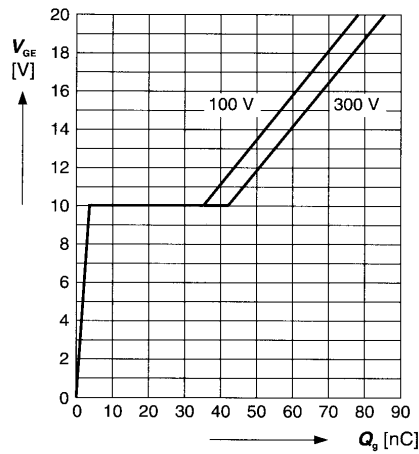
parameter:  $t_p = 250 \mu s$ ;  $T_j = 125^\circ C$



### Typ. gate charge

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

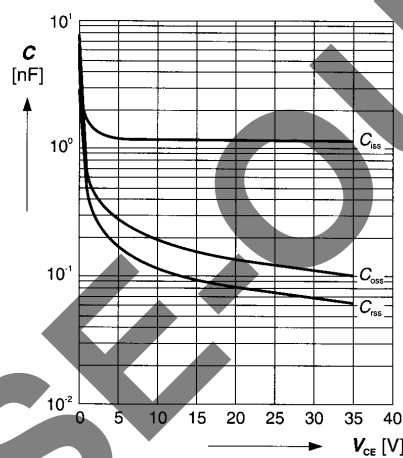
parameter:  $I_{C\ pulis} = 20\ A$



### Typ. capacitances

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

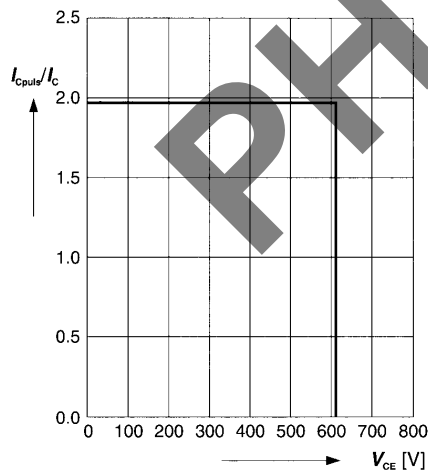
parameter:  $V_{GE} = 0\ V$ ;  $f = 1\ MHz$



### Reverse biased safe operating area

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

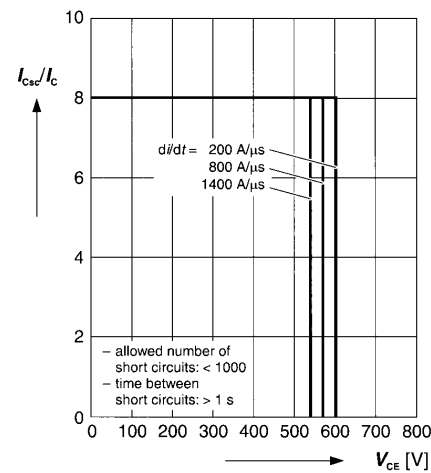
parameter:  $V_{GE} = 15\ V$



### Short circuit safe operating area

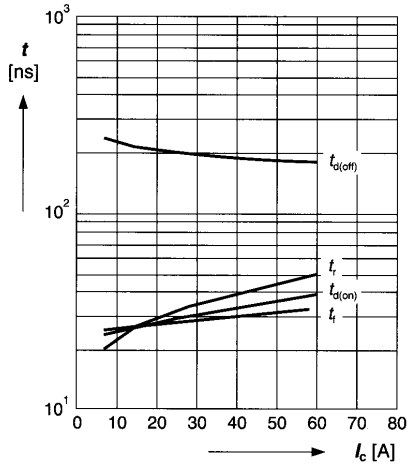
$$I_{C\ sc} = f(V_{CE}), T_j = 150^\circ C$$

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



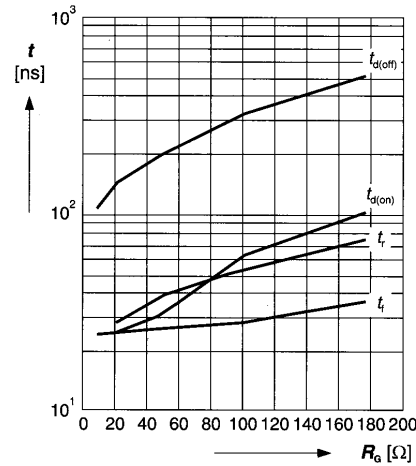
**Typ. switching time**

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



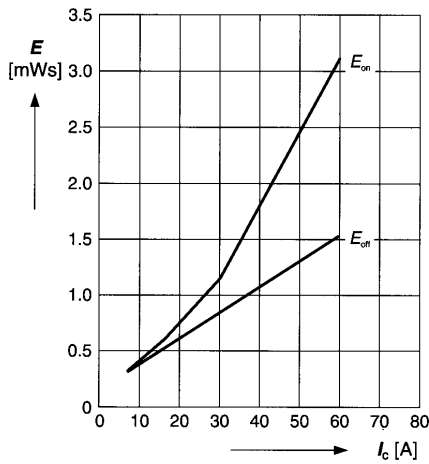
**Typ. switching time**

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



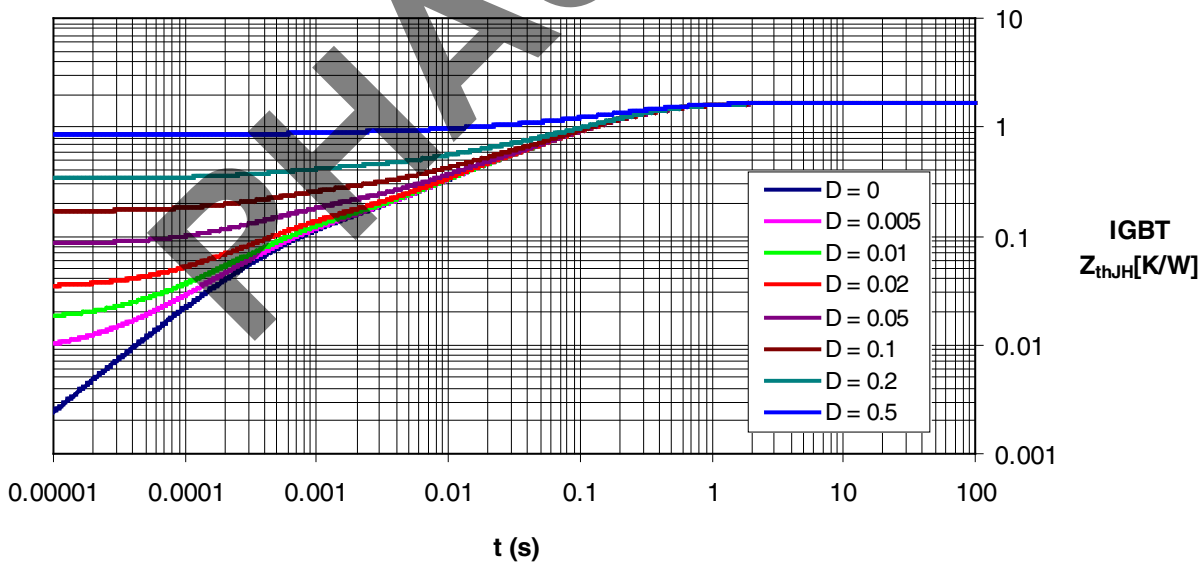
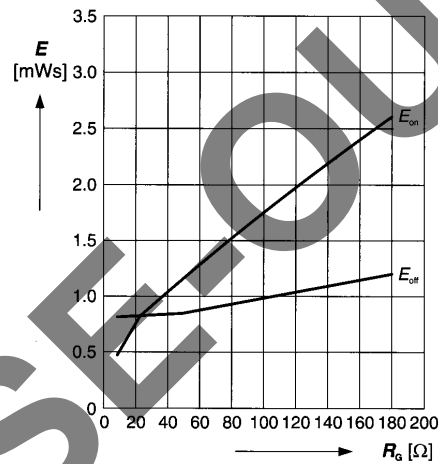
**Typ. switching losses**

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

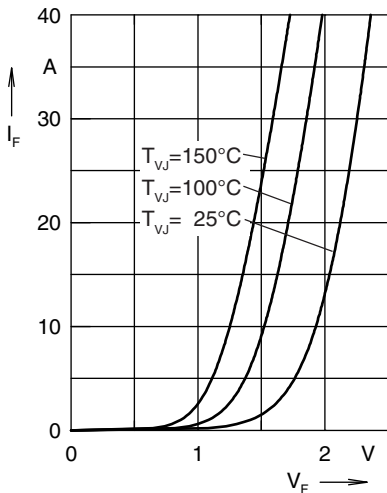


**Typ. switching losses**

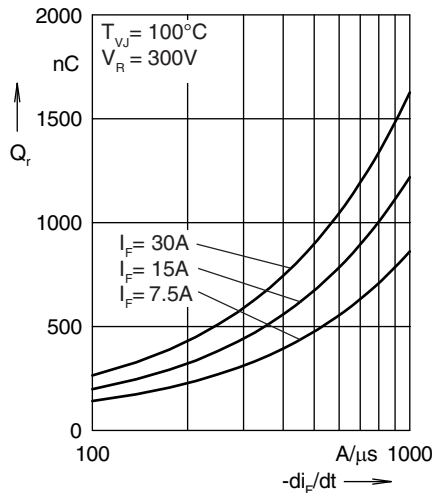
$E = f(R_G)$ , inductive load,  $T_J = 125\text{ }^\circ\text{C}$   
 parameter:  $V_{CE} = 300\text{ V}$ ;  $V_{GE} = \pm 15\text{ V}$ ;  $I_C = 30\text{ A}$



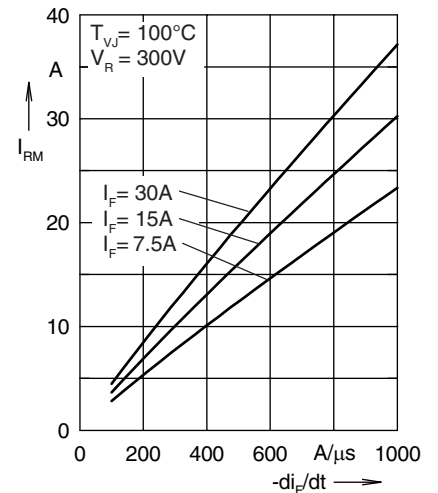
## Diode



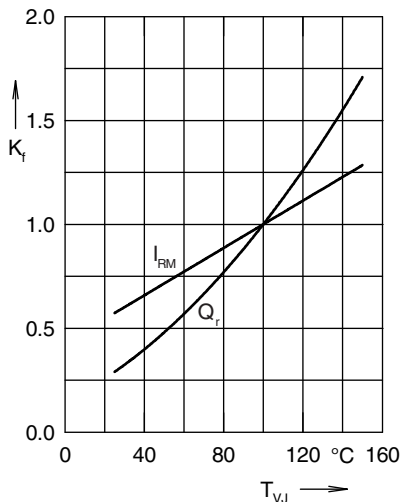
Forward current  $I_F$  versus  $V_F$



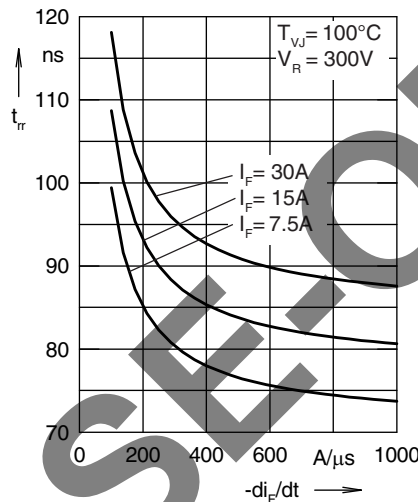
Reverse recovery charge  $Q_r$  versus  $-di_F/dt$



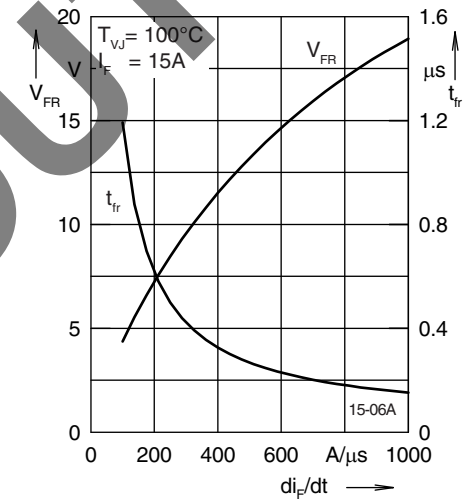
Peak reverse current  $I_{RM}$  versus  $-di_F/dt$



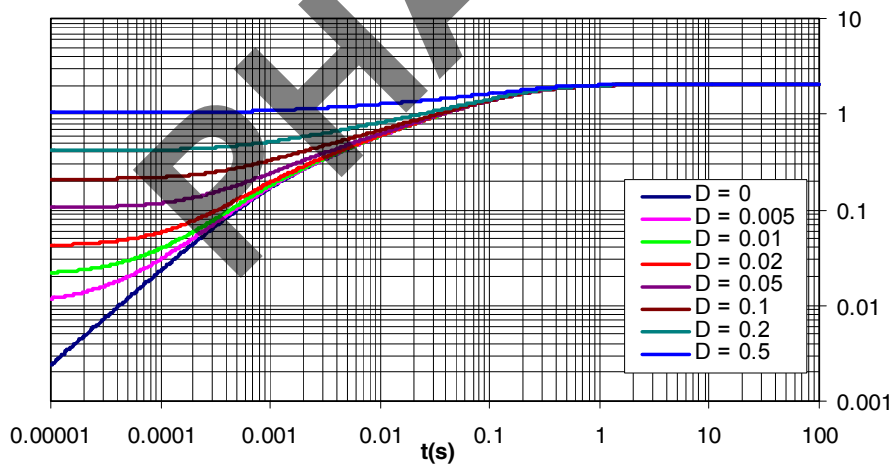
Dynamic parameters  $Q_r$ ,  $I_{RM}$  versus  $T_{VJ}$



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]