

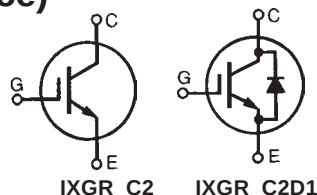
HiPerFAST™ IGBT ISOPLUS247™

Lightspeed 2™ Series
(Electrically Isolated Back Surface)

IXGR 60N60C2
IXGR 60N60C2D1

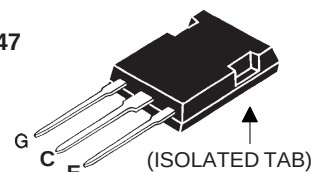
$V_{CES} = 600 \text{ V}$
 $I_{C25} = 75 \text{ A}$
 $V_{CE(sat)} = 2.7 \text{ V}$
 $t_{fi(typ)} = 35 \text{ ns}$

Preliminary Data Sheet



Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ\text{C to } 150^\circ\text{C}$	600	V
V_{CGR}	$T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GE} = 1 \text{ M}\Omega$	600	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$ (limited by leads)	75	A
I_{C110}	$T_C = 110^\circ\text{C}$	48	A
I_{F110}	$T_C = 110^\circ\text{C}$ (IXGR60N60C2D1)	39	A
I_{CM}	$T_C = 25^\circ\text{C}, 1 \text{ ms}$	300	A
SSOA (RBSOA)	$V_{GE} = 15 \text{ V}, T_{VJ} = 125^\circ\text{C}, R_G = 10 \Omega$ Clamped inductive load @ $V_{CE} \leq 600 \text{ V}$	$I_{CM} = 100$	A
P_C	$T_C = 25^\circ\text{C}$	250	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
V_{ISOL}	50/60 Hz RMS, $t = 1 \text{ m}$	2500	V
Weight		5	g
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	$^\circ\text{C}$

ISOPLUS247
(IXGR)



G = Gate C = Collector
E = Emitter

Features

- DCB Isolated mounting tab
- Meets TO-247AD package Outline
- High current handling capability
- Latest generation HDMOS™ process
- MOS Gate turn-on
- drive simplicity

Applications

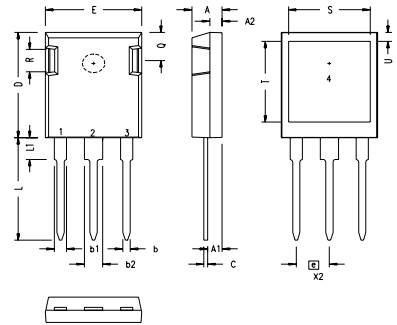
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- AC motor speed control
- DC servo and robot drives
- DC choppers

Advantages

- Easy assembly
- High power density
- Very fast switching speeds for high frequency applications

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		Min.	Typ.	Max.
BV_{CES}	$I_C = 1 \text{ mA}, V_{GE} = 0 \text{ V}$	600		V
$V_{GE(th)}$	$I_C = 250 \mu\text{A}, V_{CE} = V_{GE}$	3.0		V
I_{CES}	$V_{CE} = V_{CES}$ $V_{GE} = 0 \text{ V}$	GR60N60C2 GR60N60C2D1		50 650 μA
I_{GES}	$V_{CE} = 0 \text{ V}, V_{GE} = \pm 20 \text{ V}$			$\pm 100 \text{ nA}$
$V_{CE(sat)}$	$I_C = 50 \text{ A}, V_{GE} = 15 \text{ V}$ Note 1	$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$	2.3 2.0	2.7 V

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		Min.	Typ.	Max.
g_{fs}	$I_C = 50\text{ A}$; $V_{CE} = 10\text{ V}$, Note 1	40	55	S
C_{ies}	$V_{CE} = 25\text{ V}$, $V_{GE} = 0\text{ V}$, $f = 1\text{ MHz}$	60N60C2 60N60C2D1	3900	pF
C_{oes}			280	pF
C_{res}			320	pF
Q_g	$I_C = 50\text{ A}$, $V_{GE} = 15\text{ V}$, $V_{CE} = 0.5 V_{CES}$		140	nC
Q_{ge}			28	nC
Q_{gc}			35	nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 50\text{ A}$, $V_{GE} = 15\text{ V}$ $V_{CE} = 400\text{ V}$, $R_G = R_{off} = 2.0\ \Omega$		18	ns
t_{ri}			25	ns
$t_{d(off)}$			95	150 ns
t_{fi}			35	ns
E_{off}			0.49	0.8 mJ
$t_{d(on)}$	Inductive load, $T_J = 125^\circ\text{C}$ $I_C = 50\text{ A}$, $V_{GE} = 15\text{ V}$ $V_{CE} = 400\text{ V}$, $R_G = R_{off} = 2.0\ \Omega$		18	ns
t_{ri}			25	ns
E_{on}			1.6	mJ
$t_{d(off)}$			130	ns
t_{fi}			80	ns
E_{off}			0.92	mJ
$R_{thJ-DCB}$	(Note 2)	0.25	0.50	K/W
R_{thJC}	(Note 3)			K/W
R_{thCS}				0.15 K/W

ISOPLUS 247 Outline


SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.045	.055	1.14	1.40
b1	.075	.084	1.91	2.13
b2	.115	.123	2.92	3.12
C	.024	.031	0.61	0.80
D	.819	.840	20.80	21.34
E	.620	.635	15.75	16.13
e	.215 BSC		5.45 BSC	
L	.780	.800	19.81	20.32
L1	.150	.170	3.81	4.32
Q	.220	.244	5.59	6.20
R	.170	.190	4.32	4.83
S	.520	.540	13.21	13.72
T	.620	.640	15.75	16.26
U	.065	.080	1.65	2.03

- 1 - GATE
2 - DRAIN (COLLECTOR)
3 - SOURCE (EMITTER)
4 - NO CONNECTION

NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-247AD except screw hole.

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
V_F	$I_F = 60\text{ A}$, $V_{GE} = 0\text{ V}$, Note 1 $T_J = 150^\circ\text{C}$			2.0 V 1.39
I_{RM}	$I_F = 60\text{ A}$, $V_{GE} = 0\text{ V}$, $-di_F/dt = 100\text{ A}/\mu$ $V_R = 100\text{ V}$ $T_J = 100^\circ\text{C}$			8.3 A
t_{rr}	$I_F = 1\text{ A}$; $-di_F/dt = 200\text{ A}/\text{ms}$; $V_R = 30\text{ V}$		35	ns
R_{thJC}				0.85 K/W

Note 1: Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$

- 2: $R_{thJ-DCB}$ is the thermal resistance junction-to-internal side of DCB substrate
3: R_{thJC} is the thermal resistance junction-to-external side of DCB substrate

IXYS reserves the right to change limits, test conditions, and dimensions.

IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:	4,850,072	4,931,844	5,034,796	5,063,307	5,237,481	5,381,025	6,404,065B1	6,162,665	6,534,343	6,583,505
	4,835,592	4,881,106	5,017,508	5,049,961	5,187,117	5,486,715	6,306,728B1	6,259,123B1	6,306,728B1	6,683,344

Fig. 1. Output Characteristics
@ 25 Deg. C

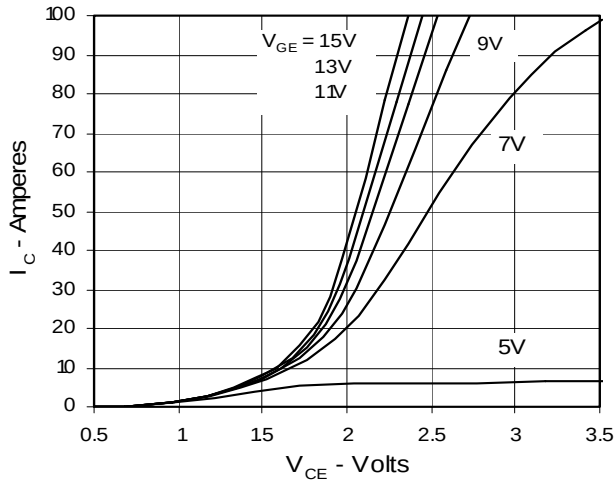


Fig. 2. Extended Output Characteristics
@ 25 deg. C

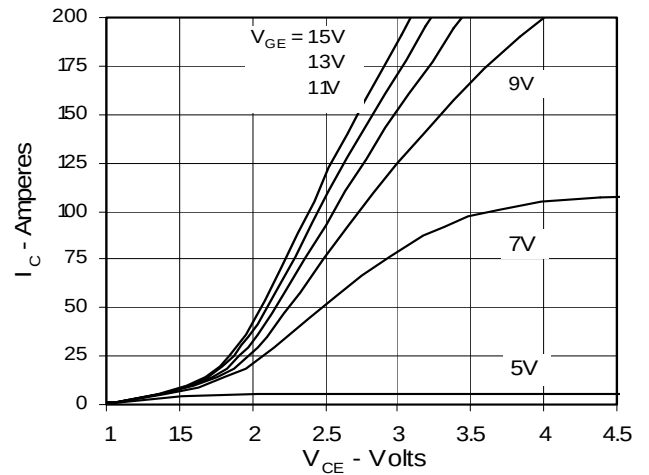


Fig. 3. Output Characteristics
@ 125 Deg. C

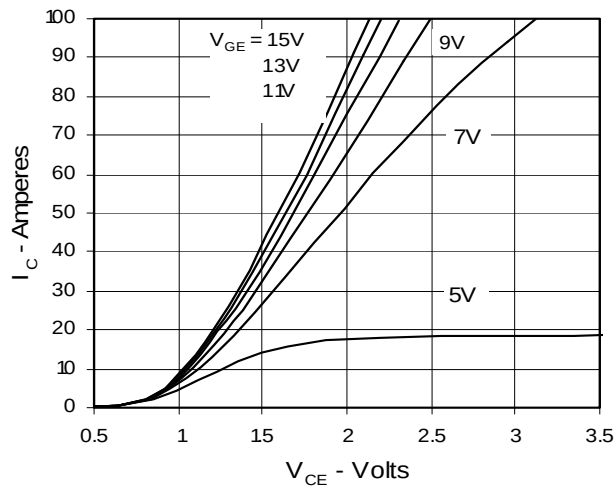


Fig. 4. Temperature Dependence of $V_{CE(sat)}$

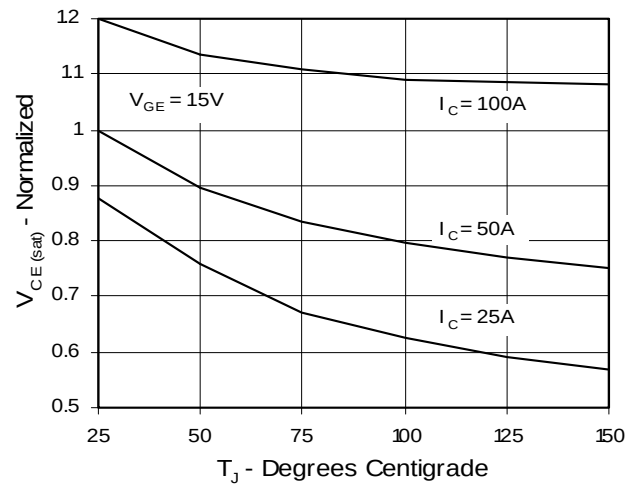


Fig. 5. Collector-to-Emitter Voltage
vs. Gate-to-Emitter voltage

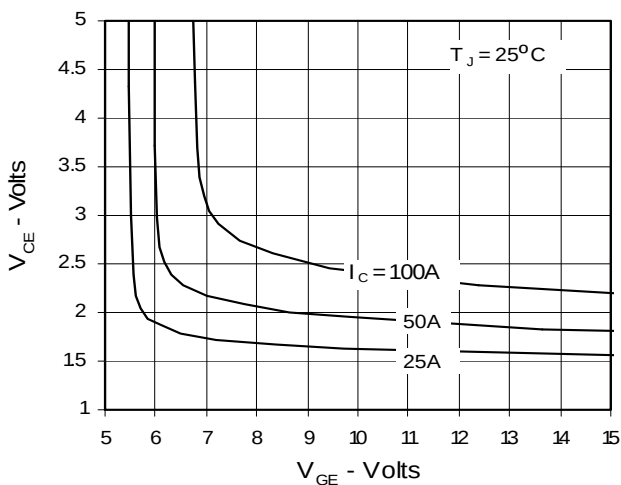


Fig. 6. Input Admittance

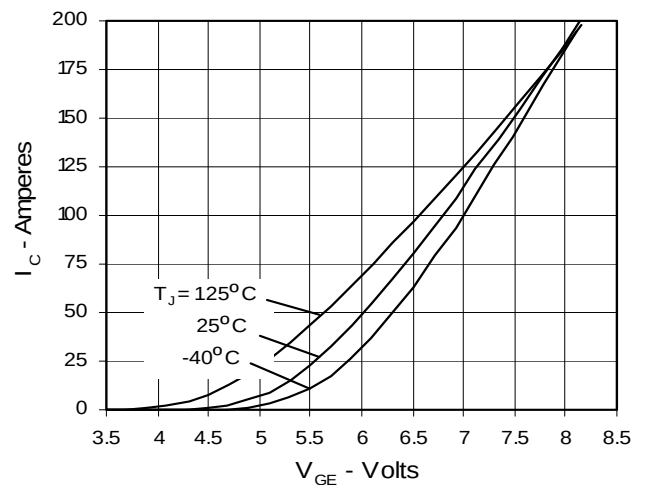


Fig. 7. Transconductance

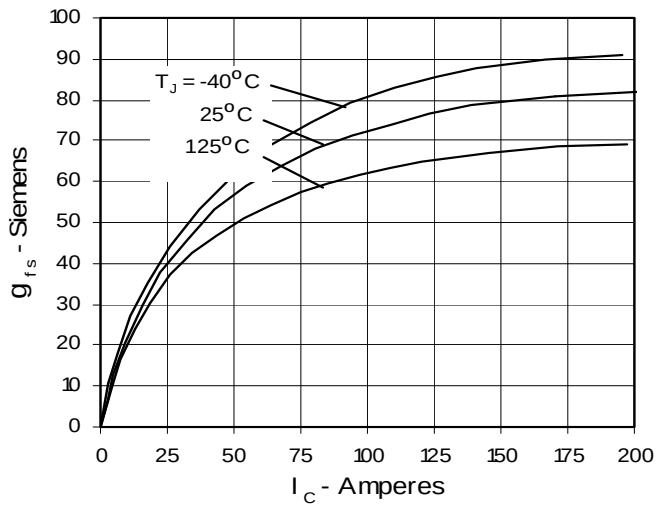


Fig. 8. Dependence of E_{off} on R_G

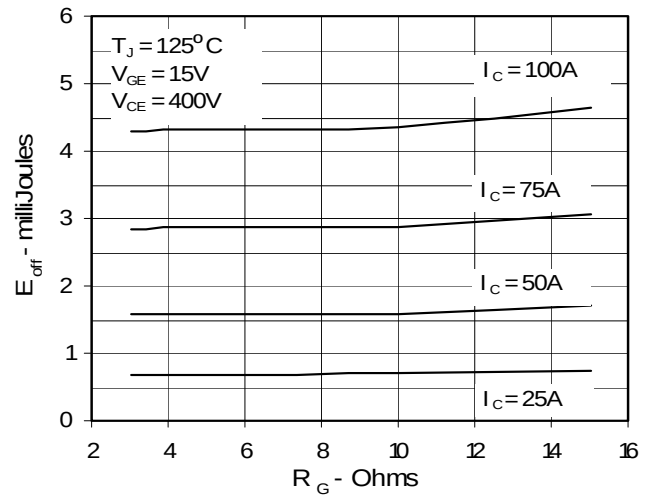


Fig. 9. Dependence of E_{off} on I_C

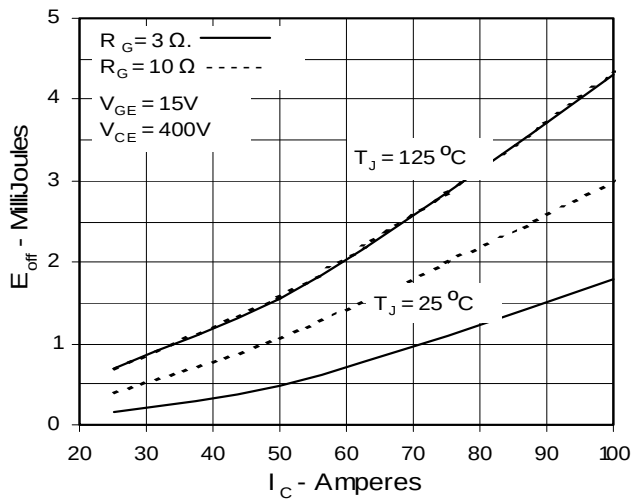


Fig. 10. Dependence of E_{off} on Temperature

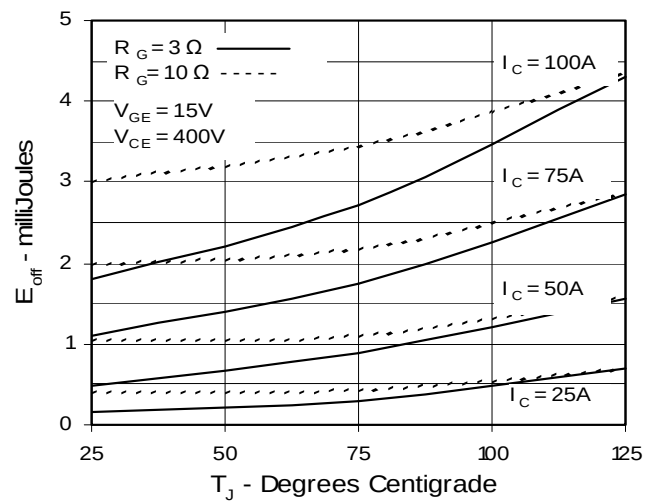


Fig. 11. Gate Charge

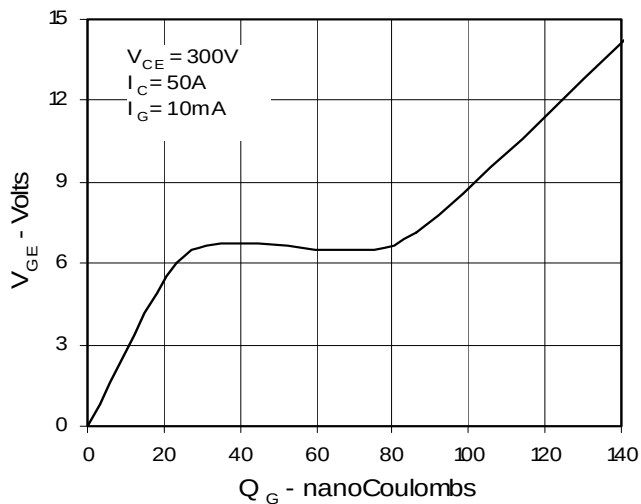


Fig. 12. Capacitance

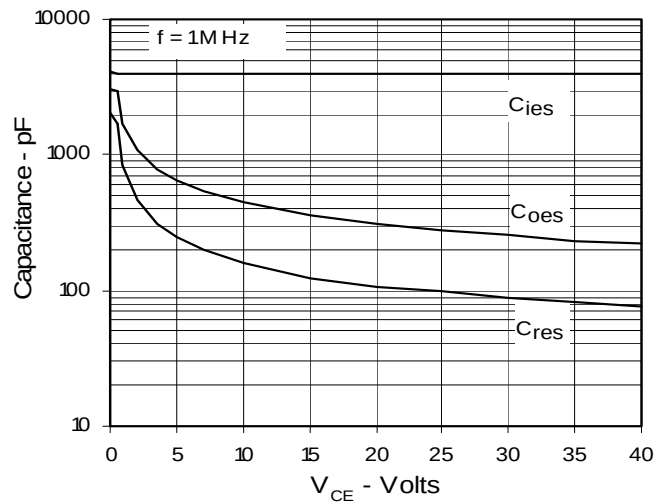
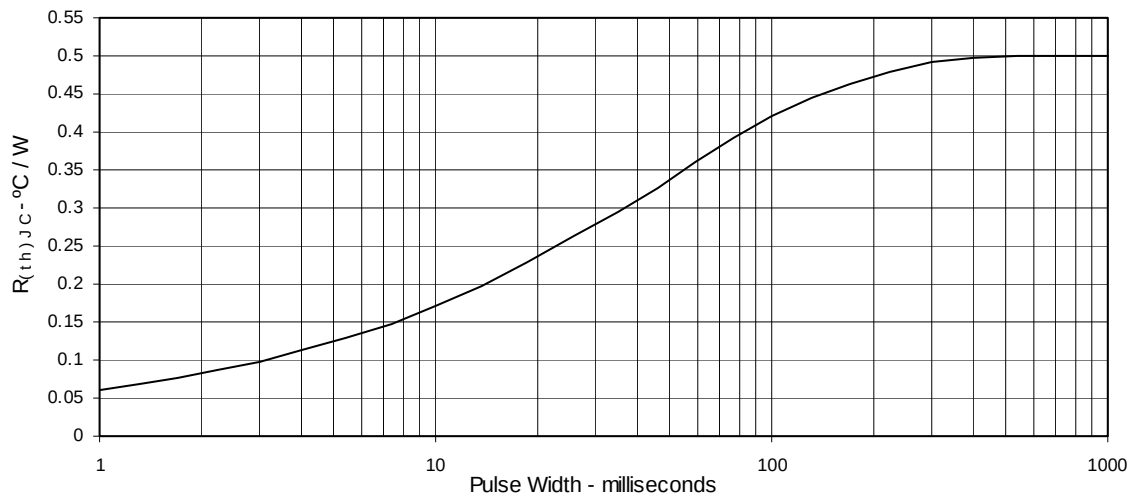


Fig. 13. Maximum Transient Thermal Resistance



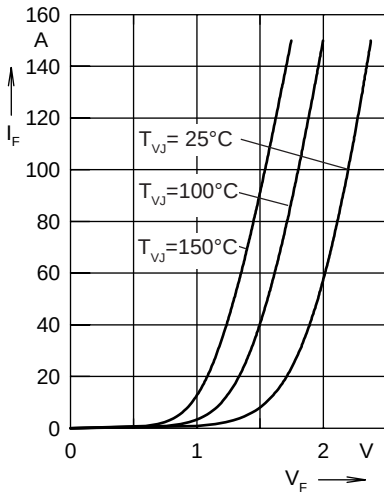


Fig. 14. Forward current I_F versus V_F

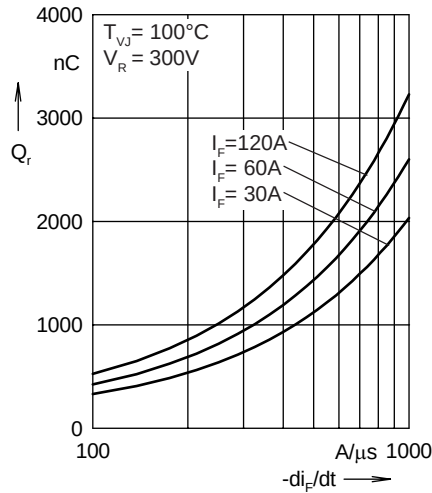


Fig. 15. Reverse recovery charge Q_r versus $-di_F/dt$

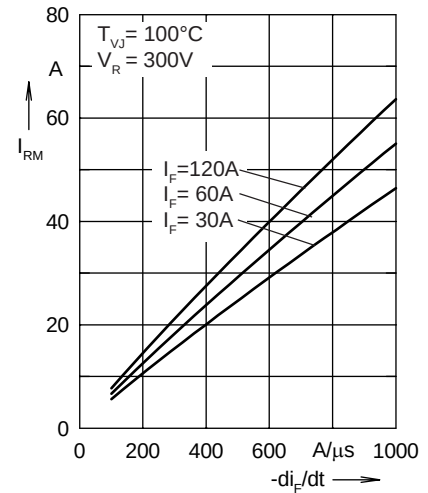


Fig. 16. Peak reverse current I_{RM} versus $-di_F/dt$

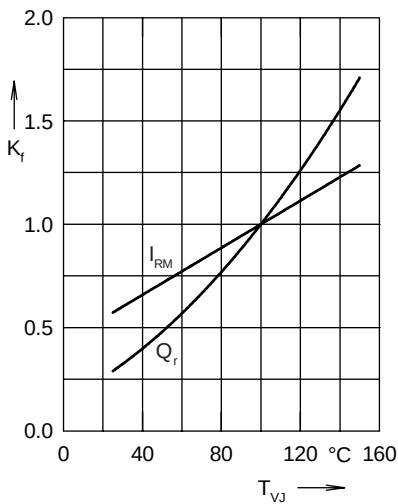


Fig. 17. Dynamic parameters Q_r , I_{RM} versus T_{VJ}

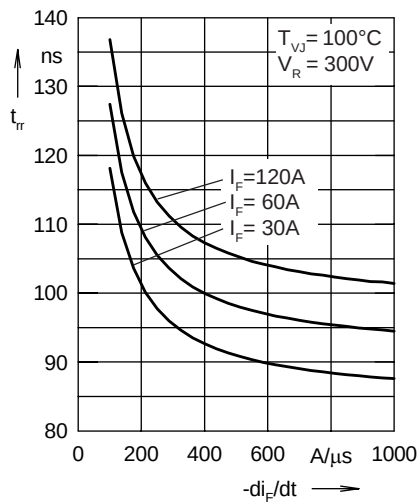


Fig. 18. Recovery time t_{rr} versus $-di_F/dt$

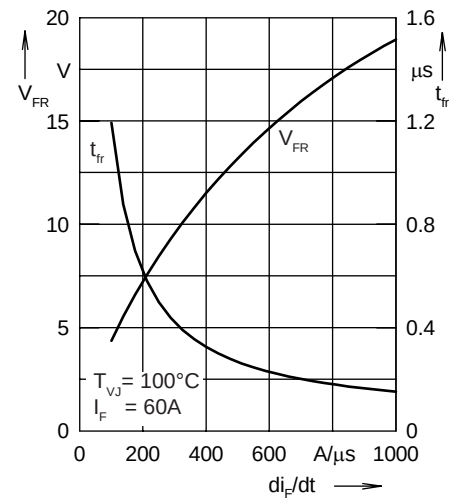


Fig. 19. Peak forward voltage V_{FR} and t_{fr} versus di_F/dt

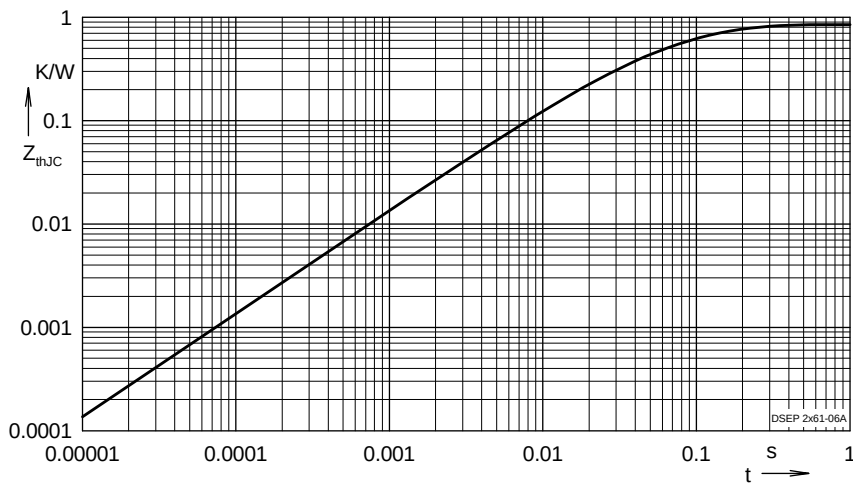


Fig. 20. Transient thermal resistance junction to case

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.3073	0.0055
2	0.3533	0.0092
3	0.0887	0.0007
4	0.1008	0.0399