IXYS

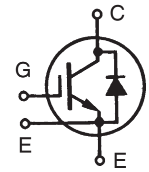
IGBT with Diode

IXSN 80N60BD1

Short Circuit SOA Capability

V_{CES} = 600 V
I_{C25} = 160 A
$V_{CE(sat)}$ = 2.5 V
t_{fi} = 180 ns

Preliminary Data Sheet

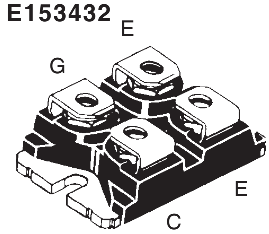


Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	600	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MΩ	600	A
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C (Silicon chip capability)	160	A
I_L	Lead current limit (RMS)	100	A
I_{C90}	T_C = 90°C	80	A
I_{CM}	T_C = 25°C, 1 ms	300	A
SSOA (RBSOA)	V_{GE}= 15 V, T_{VJ} = 125°C, R_G = 5 Ω Clamped inductive load	I_{CM} = 160 @ 0.8 V_{CES}	A
t_{SC} (SCSOA)	V_{GE}= 15 V, V_{CE} = 360 V, T_J = 125°C R_G = 22 Ω, non repetitive	10	µs
P_C	T_C = 25°C	420	W
V_{ISOL}	50/60 Hz t = 1 min I_{ISOL} ≤ 1 mA t = 1 s	2500 3000	V~ V~
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
M_d	Mounting torque	0.4/6 Nm/lb.in.	
Weight		30	g

Symbol	Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
BV_{CES}	I_C = 500 µA, V_{GE} = 0 V		600			V
$V_{GE(th)}$	I_C = 8 mA, V_{CE} = V_{GE}		4		8	V
I_{CES}	V_{CE} = V_{CES} V_{GE} = 0 V	T_J = 25°C T_J = 125°C			200 2	µA mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				±200	nA
$V_{CE(sat)}$	I_C = I_{C90}, V_{GE} = 15 V; Note 1				2.5	V

miniBLOC, SOT-227 B

UL E153432



E = Emitter ①, C = Collector
G = Gate, E = Emitter ①

① Either Emitter terminal can be used as Main or Kelvin Emitter

Features

- International standard package
- Aluminium-nitride isolation
  - high power dissipation
- Isolation voltage 3000 V~
- UL registered E 153432
- Low $V_{CE(sat)}$
  - for minimum on-state conduction losses
- Fast Recovery Epitaxial Diode
  - short t_{rr} and I_{RM}
- Low collector-to-case capacitance (< 60 pF)
  - reduced RFI
- Low package inductance (< 10 nH)
  - easy to drive and to protect

Applications

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

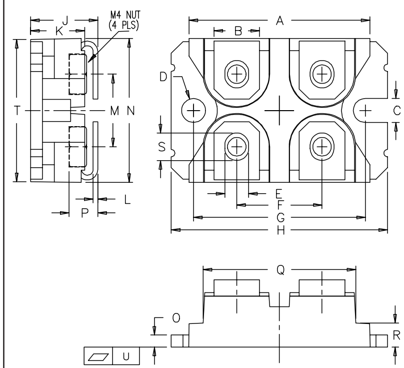
Advantages

- Space savings
- Easy to mount with 2 screws
- High power density

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

Symbol	Test Conditions ($T_J = 25°C$, unless otherwise specified)	Characteristic Values min.	typ.	max.	
g_{fs}	I_C = 60 A; V_{CE} = 10 V, Note1	52			S
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		6600		pF
C_{oes}			720		pF
C_{res}			196		pF
Q_g	$I_C = I_{C90}$, V_{GE} = 15 V, $V_{CE} = 0.5\ V_{CES}$		200		nC
Q_{ge}			70		nC
Q_{gc}			60		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		60		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V, L = 100 µH,		50		ns
$t_{d(off)}$	$V_{CE} = 0.8\ V_{CES}$, $R_G = 2.7\ \Omega$		140	280	ns
t_{fi}	Note 2		120	200	ns
E_{off}			1.8	3.5	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		60		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V, L = 100 µH		60		ns
E_{on}	$V_{CE} = 0.8\ V_{CES}$, $R_G = 2.7\ \Omega$		4.8		mJ
$t_{d(off)}$	Note 2		190		ns
t_{fi}			160		ns
E_{off}			3.3		mJ
R_{thJC}				0.30	K/W
R_{thCK}			0.05		K/W

miniBLOC, SOT-227 B



M4 screws (4x) supplied

Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches Max.
A	31.50	31.88	1.240	1.255
B	7.80	8.20	0.307	0.323
C	4.09	4.29	0.161	0.169
D	4.09	4.29	0.161	0.169
E	4.09	4.29	0.161	0.169
F	14.91	15.11	0.587	0.595
G	30.12	30.30	1.186	1.193
H	38.00	38.23	1.496	1.505
J	11.68	12.22	0.460	0.481
K	8.92	9.60	0.351	0.378
L	0.76	0.84	0.030	0.033
M	12.60	12.85	0.496	0.506
N	25.15	25.42	0.990	1.001
O	1.98	2.13	0.078	0.084
P	4.95	5.97	0.195	0.235
Q	26.54	26.90	1.045	1.059
R	3.94	4.42	0.155	0.174
S	4.72	4.85	0.186	0.191
T	24.59	25.07	0.968	0.987
U	-0.05	0.1	-0.002	0.004

Reverse Diode (FRED)

Symbol	Test Conditions	Characteristic Values ($T_J = 25°C$, unless otherwise specified) typ.	max.	
V_F	I_F = 60 A, Note 1		2.05	V
	T_J = 150°C		1.4	V
I_{RM}	$I_F = I_{C90}$, V_{GE} = 0 V, $-di_F/dt$ = 100 A/µs		8.0	A
	V_R = 100 V, T_J = 100°C			
t_{rr}	I_F = 1 A, -di/dt = 50 A/µs, V_R = 30 V	35		ns
R_{thJC}			0.85	K/W

Note: 1. Pulse test, $t \leq 300$ µs, duty cycle $d \leq 2\%$
Note: 2. Remarks: Switching times may increase for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or increased R_G

Fig. 1. Output Characteristics @ 25 Deg. C

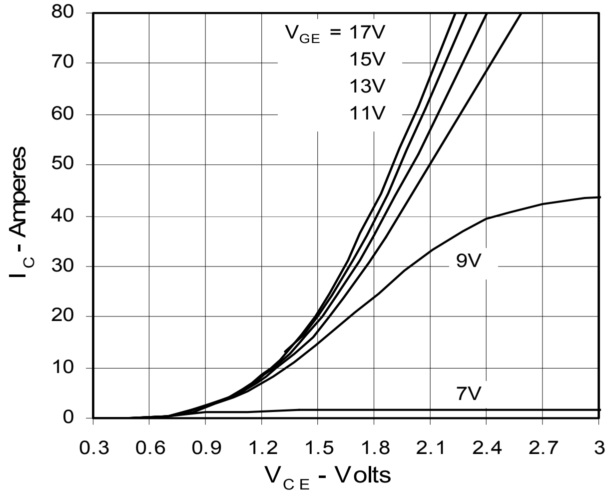


Fig. 2. Extended Output Characteristics @ 25 deg. C

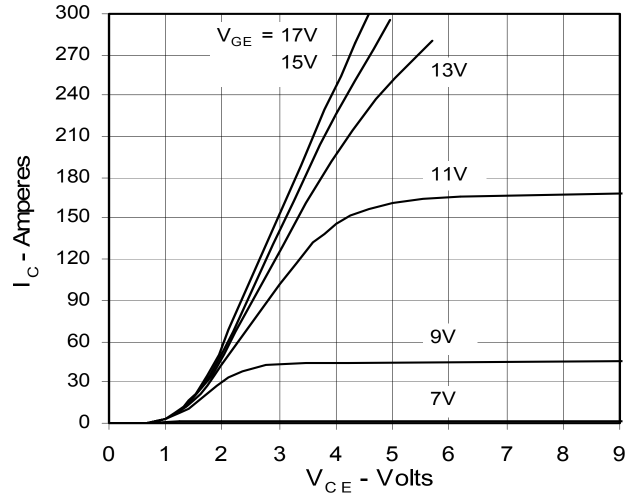


Fig. 3. Output Characteristics @ 125 Deg. C

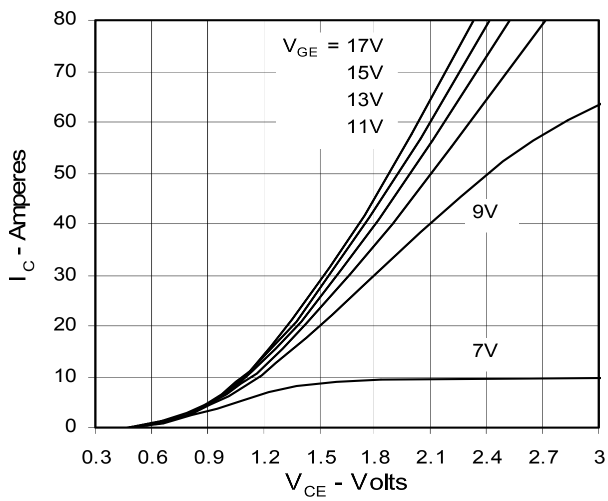


Fig. 4. Dependence of $V_{CE(sat)}$ on Temperature

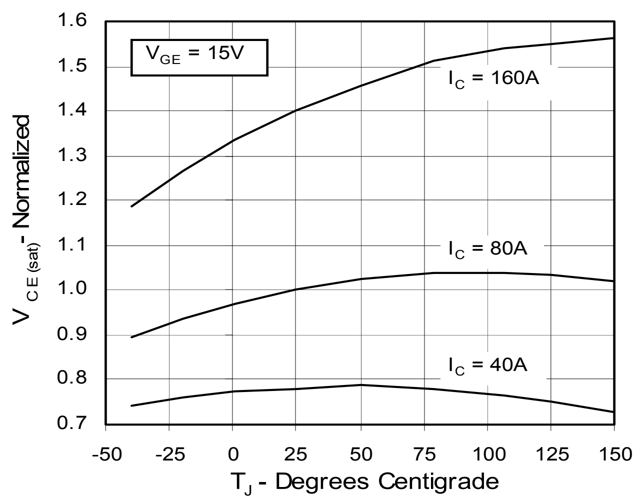


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emiiter voltage

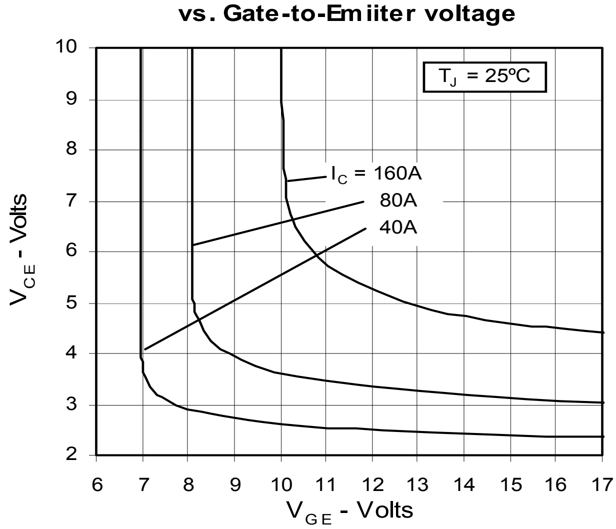


Fig. 6. Input Admittance

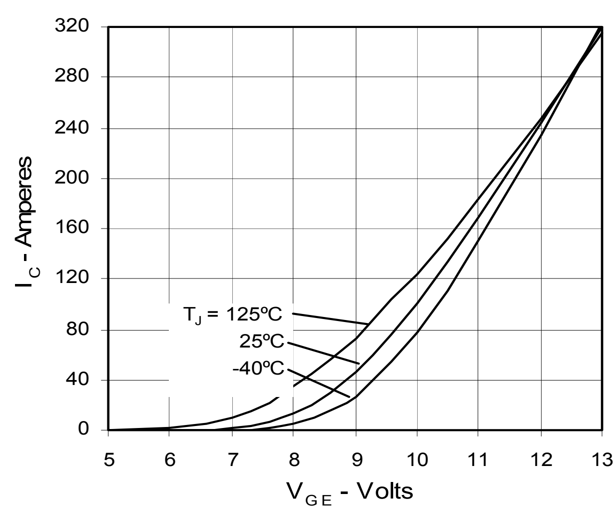


Fig. 7. Transconductance

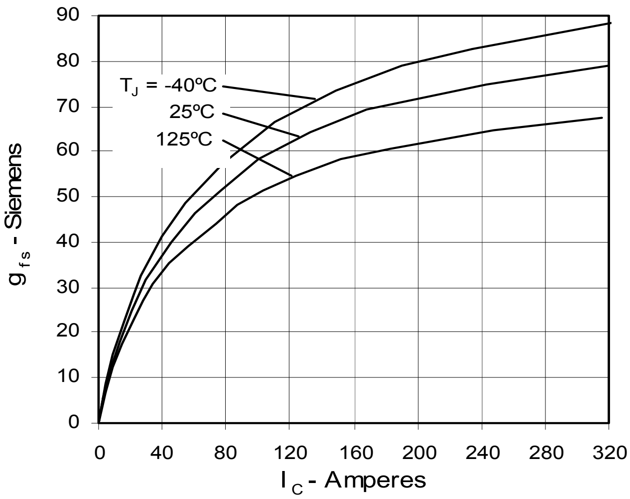


Fig. 8. Dependence of Turn-off Energy Loss on R$_G$

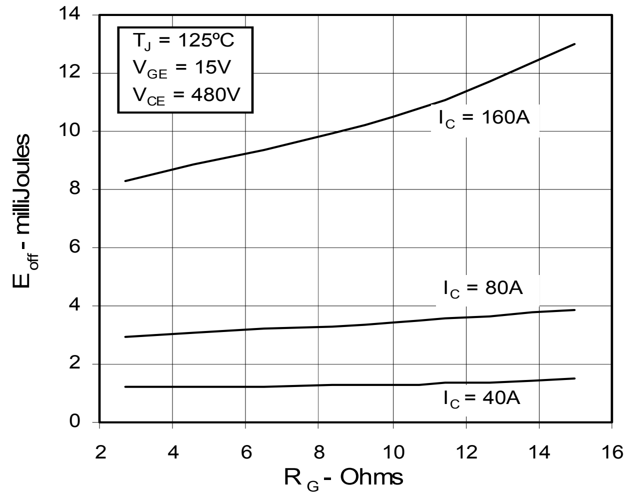


Fig. 9. Dependence of Turn-Off Energy Loss on I$_C$

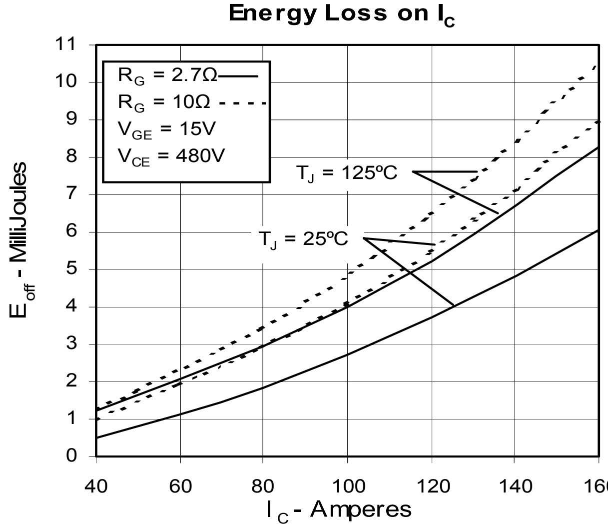


Fig. 10. Dependence of Turn-off Energy Loss on Temperature

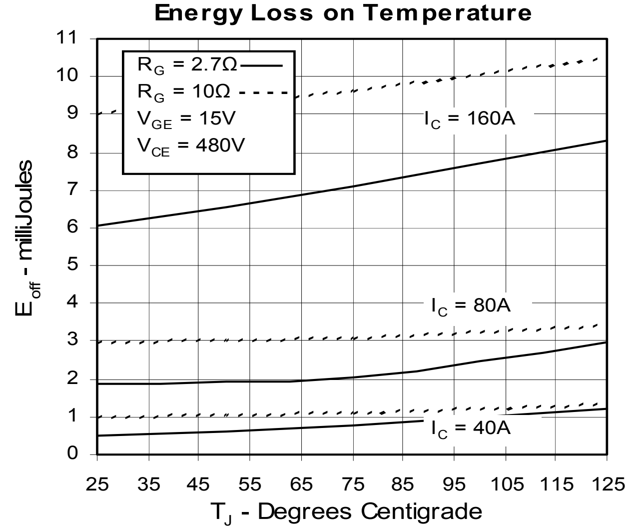


Fig. 11. Dependence of Turn-off Switching Time on R$_G$

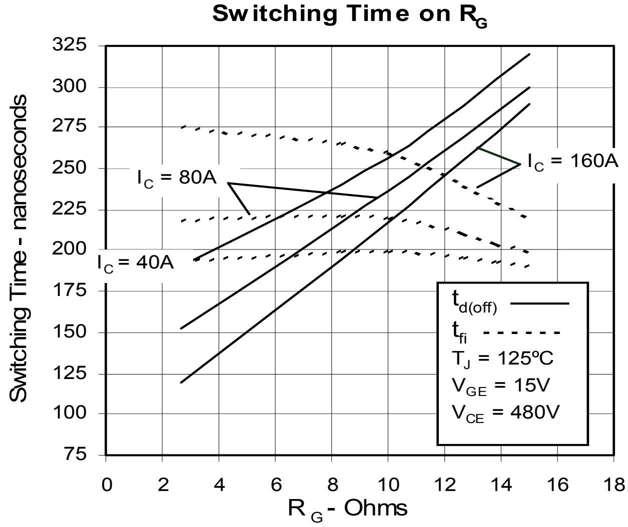


Fig. 12. Dependence of Turn-off Switching Time on I$_C$

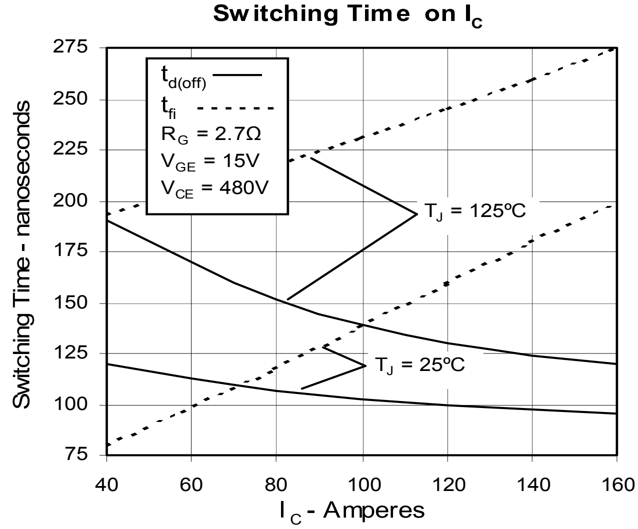


Fig. 13. Dependence of Turn-off Switching Time on Temperature

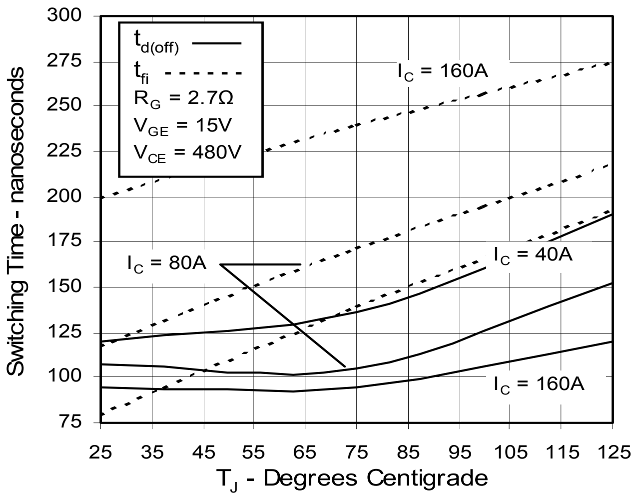


Fig. 14. Gate Charge

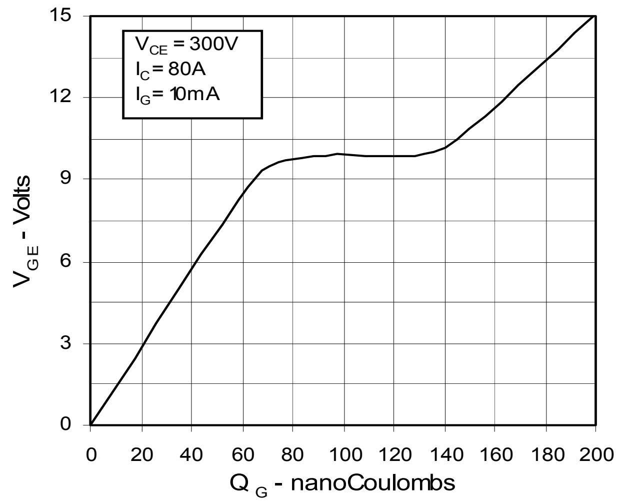


Fig. 15. Capacitance

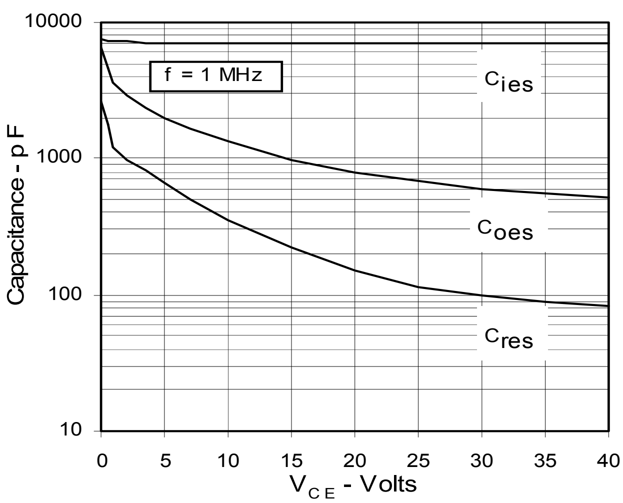
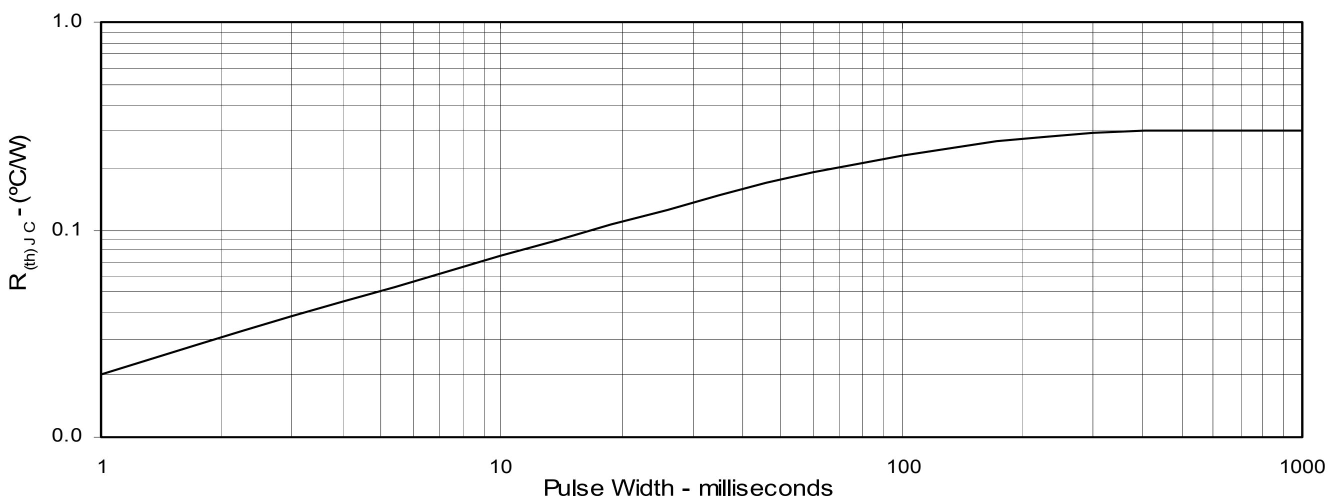


Fig. 16. Maximum Transient Thermal Resistance



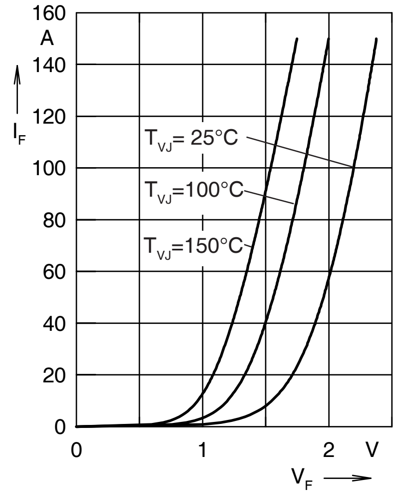


Fig. 17. Forward current I_F versus V_F

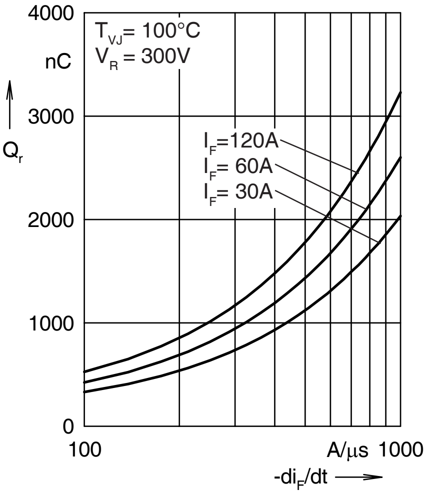


Fig. 18. Reverse recovery charge Q_r versus $-di_F/dt$

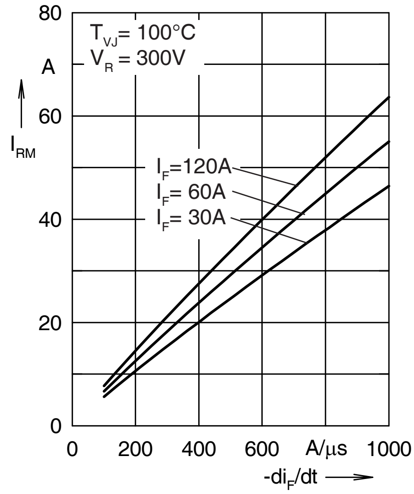


Fig. 19. Peak reverse current I_{RM} versus $-di_F/dt$

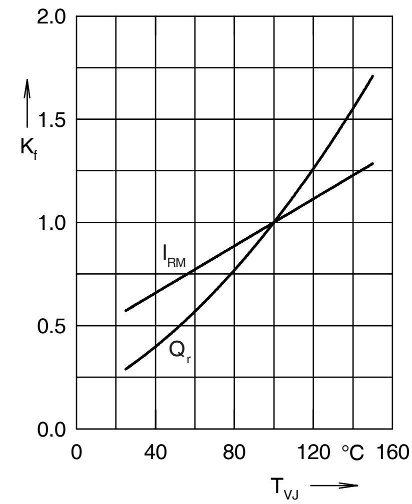


Fig. 20. Dynamic parameters Q_r, I_{RM} versus T_{VJ}

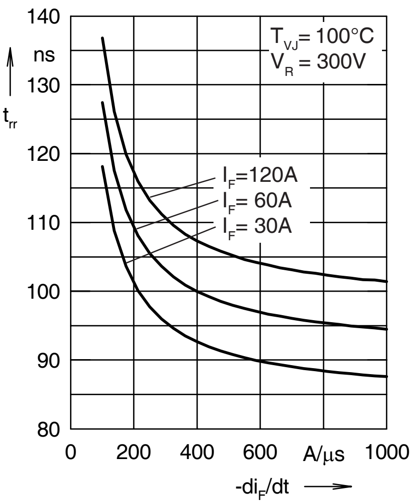


Fig. 21. Recovery time t_{rr} versus $-di_F/dt$

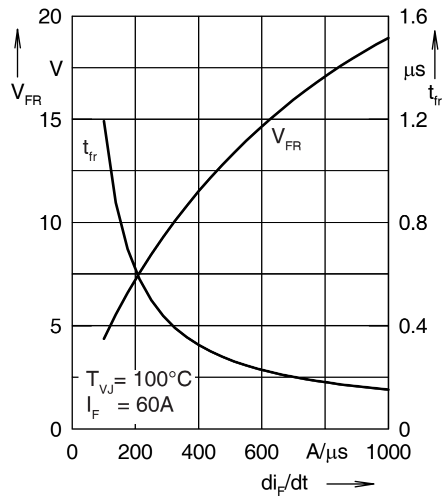


Fig. 22. Peak forward voltage V_{FR} and t_{fr} versus di_F/dt

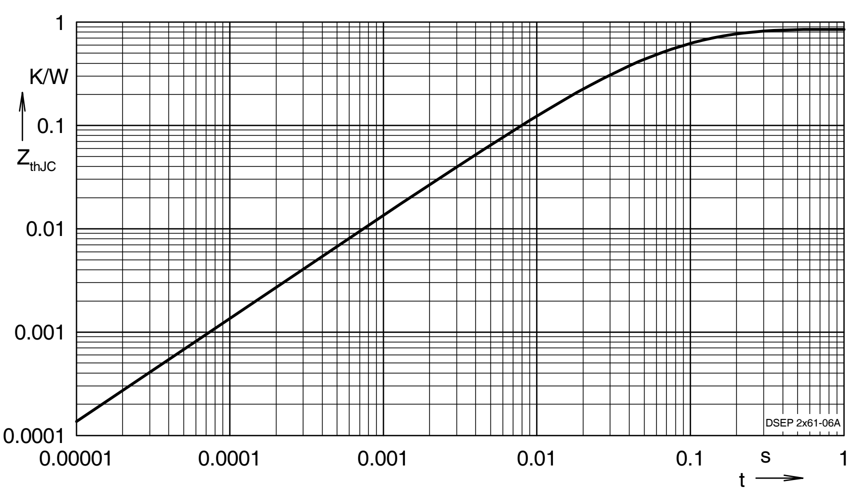


Fig. 7 Transient thermal resistance junction to case

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