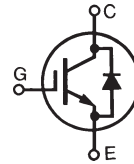


HiPerFAST™ IGBT IXGR 32N90B2D1 with Fast Diode

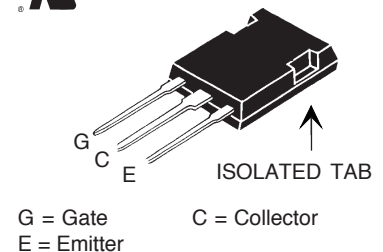
Electrically Isolated Base



$$\begin{aligned} V_{CES} &= 900 \text{ V} \\ I_{C25} &= 47 \text{ A} \\ V_{CE(sat)} &= 2.9 \text{ V} \\ t_{fi\text{typ}} &= 150 \text{ ns} \end{aligned}$$

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ\text{C}$ to 150°C	900	V
V_{CGR}	$T_J = 25^\circ\text{C}$ to 150°C ; $R_{GE} = 1 \text{ M}\Omega$	900	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$	47	A
I_{C110}	$T_C = 110^\circ\text{C}$	22	A
I_{CM}	$T_C = 25^\circ\text{C}$, 1 ms	200	A
SSOA (RBSOA)	$V_{GE} = 15 \text{ V}$, $T_{VJ} = 125^\circ\text{C}$, $R_G = 10 \Omega$ Clamped inductive load: $V_{CL} < 600\text{V}$	$I_{CM} = 64$	A
P_C	$T_C = 25^\circ\text{C}$	160	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	$^\circ\text{C}$
V_{ISOL}	50/60Hz, RMS, T= 1 minute $I_{isol} < 1\text{mA}$	2500 3000	V~ V~
F_C	Mounting force	20..120/4.5..26	N/lb
Weight		5	g

ISOPLUS247 (IXGR)
E153432



G = Gate
E = Emitter
C = Collector

Features

- Electrically isolated mounting tab
- High frequency IGBT
- High current handling capability
- MOS Gate turn-on - drive simplicity

Applications

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

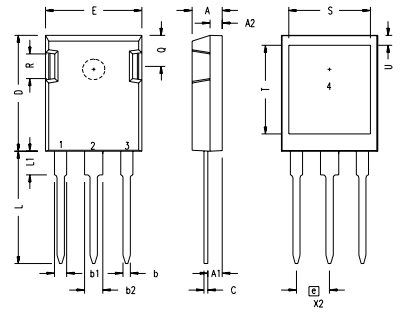
Advantages

- 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.
$V_{GE(th)}$	$I_C = 250 \mu\text{A}$, $V_{CE} = V_{GE}$	3.0		5.0 V
I_{CES}	$V_{CE} = V_{CES}$ $V_{GE} = 0 \text{ V}$ $T_J = 150^\circ\text{C}$			300 μA 1.5 mA
I_{GES}	$V_{CE} = 0 \text{ V}$, $V_{GE} = \pm 20 \text{ V}$			$\pm 100 \text{ nA}$
$V_{CE(sat)}$	$I_C = I_T$, $V_{GE} = 15 \text{ V}$, Note 1 $T_J = 125^\circ\text{C}$		2.1	2.9 V V

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$ unless otherwise specified)		
		min.	typ.	max.
g_{fs}	$I_C = I_T; V_{CE} = 10\text{ V}$	18	28	S
C_{ies}	$V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$		1790	pF
C_{oes}			146	pF
C_{res}			49	pF
Q_g	$I_C = I_T, V_{GE} = 15\text{ V}, V_{CE} = 0.5 V_{CES}$		89	nC
Q_{ge}			15	nC
Q_{gc}			34	nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = I_T, V_{GE} = 15\text{ V}$ $V_{CE} = 720\text{ V}, R_G = R_{off} = 5\ \Omega$		20	ns
t_{ri}			22	ns
$t_{d(off)}$			260	400 ns
t_{fi}			150	ns
E_{off}			2.2	4.5 mJ
$t_{d(on)}$	Inductive load, $T_J = 125^\circ\text{C}$ $I_C = I_T, V_{GE} = 15\text{ V}$ $V_{CE} = 720\text{ V}, R_G = R_{off} = 5\ \Omega$		20	ns
t_{ri}			22	ns
E_{on}			3.8	mJ
$t_{d(off)}$			360	ns
t_{fi}			330	ns
E_{off}		5.75	mJ	
R_{thJC}			0.8	KW
R_{thCS}		0.15		KW

ISOPLUS247 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- COLLECTOR/CATHODE
- 3- EMITTER/ANODE
- 4- NO CONNECTION

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

Ultrafast Diode

Symbol	Conditions	Maximum Ratings	
I_{FRMS}		60	A
I_{F110}	$T_C = 110^\circ\text{C}$	22	A

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
V_F	$I_F = 30\text{ A}$ $T_{VJ} = 125^\circ\text{C}$		1.8	2.75 V
I_{RM}	$I_F = 50\text{ A}; di_F/dt = -100\text{ A}/\mu\text{s}; T_{VJ} = 100^\circ\text{C}$ $V_R = 100\text{ V}; V_{GE} = 0\text{ V}$		5.5	11.4 A
t_{rr}			190	ns
R_{thJC}			0.15	1.1 KW
R_{thCS}				KW

Notes:

1. Pulse test: Pulse width < 300 μs , duty cycle < 2 %;
2. Test current $I_T = 32\text{ A}$.

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:	4,835,592	4,931,844	5,049,961	5,237,481	6,162,665	6,404,065 B1	6,683,344	6,727,585
	4,850,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405 B2	6,759,692
	4,881,106	5,034,796	5,187,117	5,486,715	6,306,728 B1	6,583,505	6,710,463	6,771,478 B2

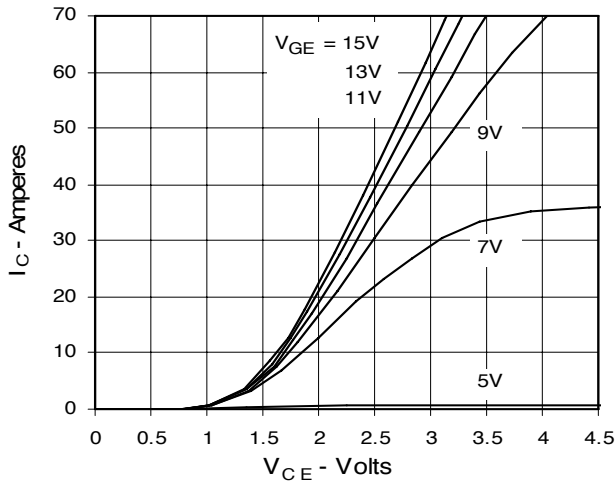
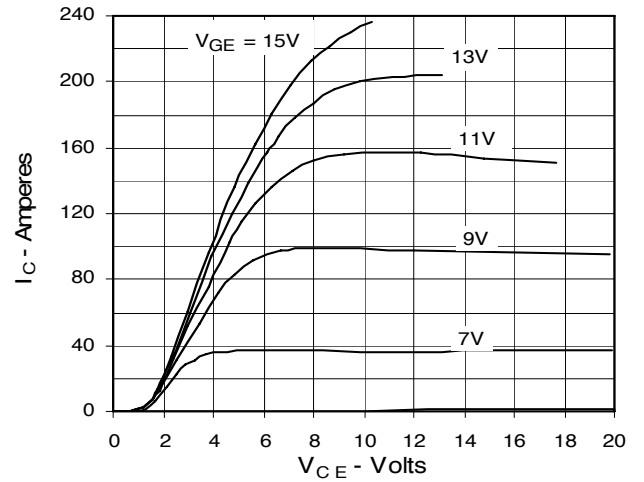
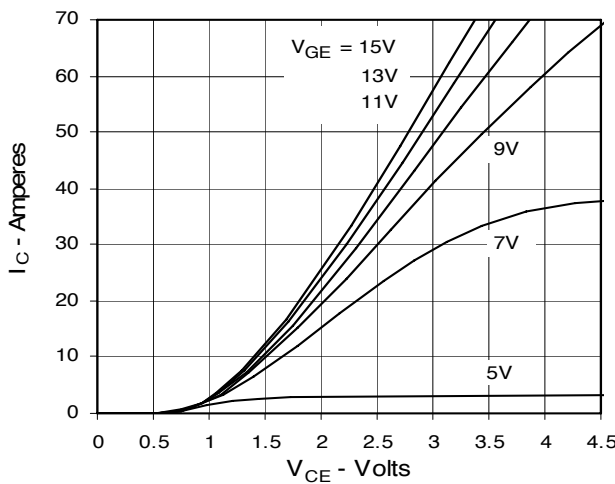
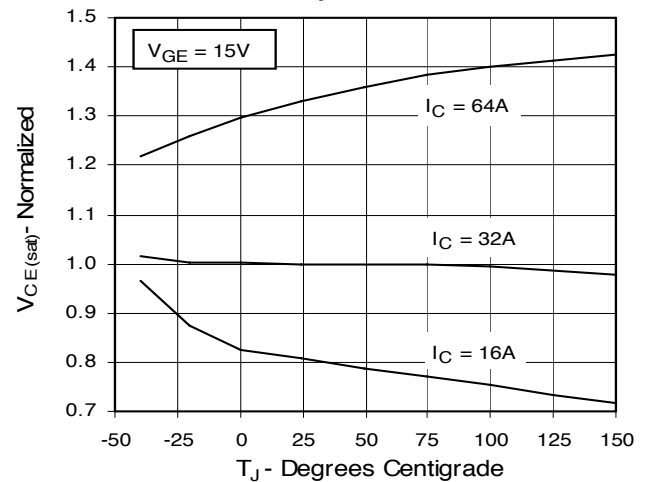
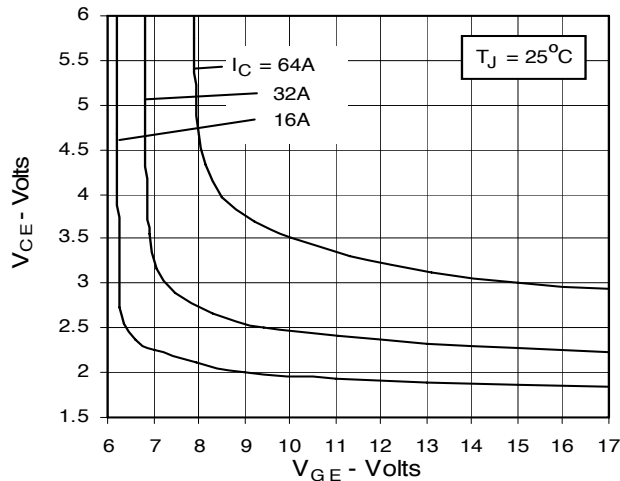
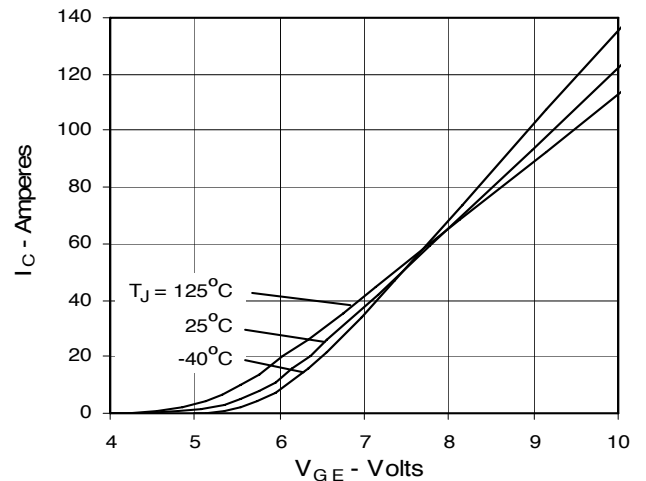
**Fig. 1. Output Characteristics
@ 25 °C**

**Fig. 2. Extended Output Characteristics
@ 25 °C**

**Fig. 3. Output Characteristics
@ 125 °C**

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

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

Fig. 6. Input Admittance


Fig. 7. Transconductance

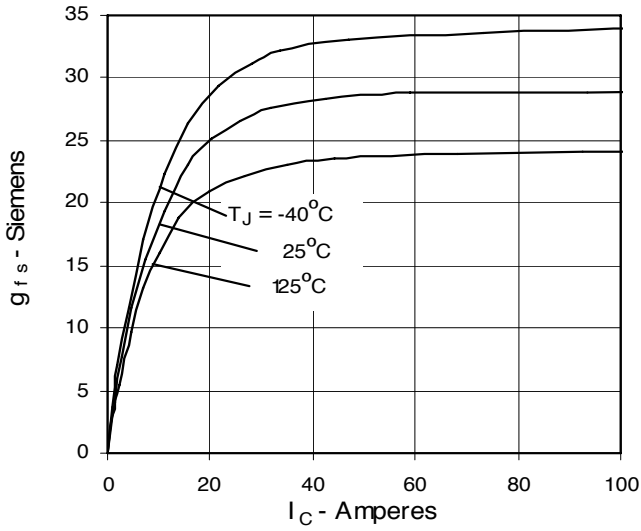


Fig. 8. Gate Charge

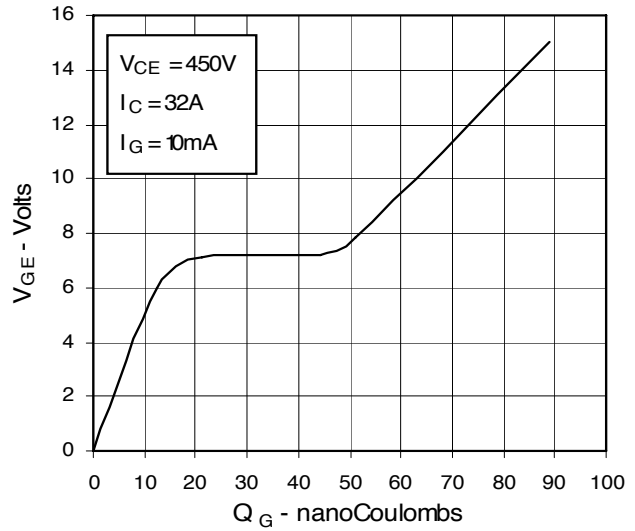


Fig. 9. Capacitance

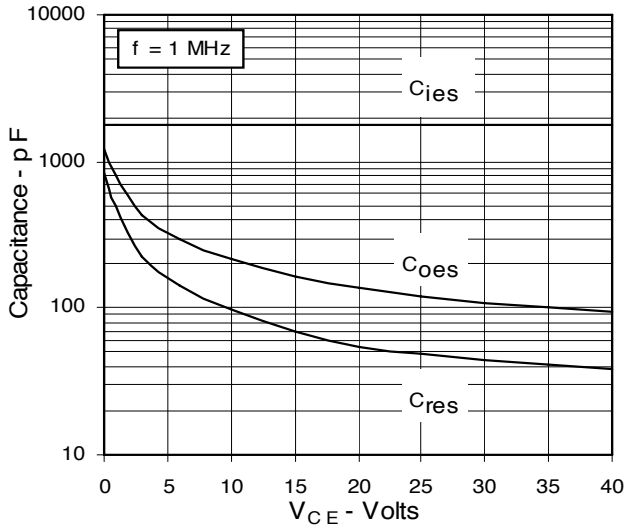


Fig. 10. Reverse-Bias Safe Operating Area

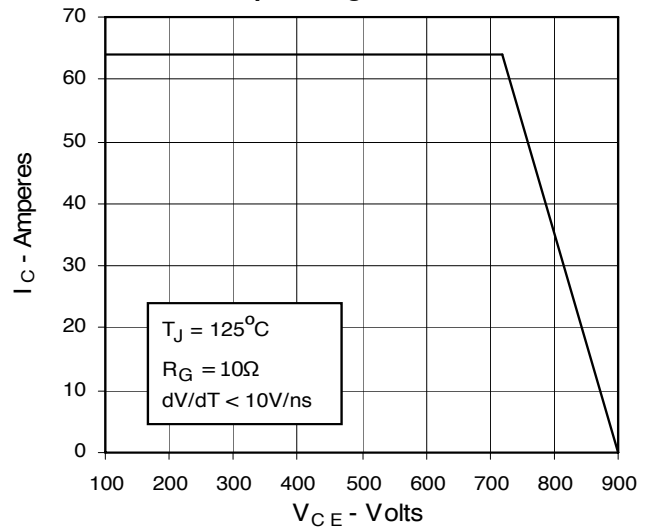
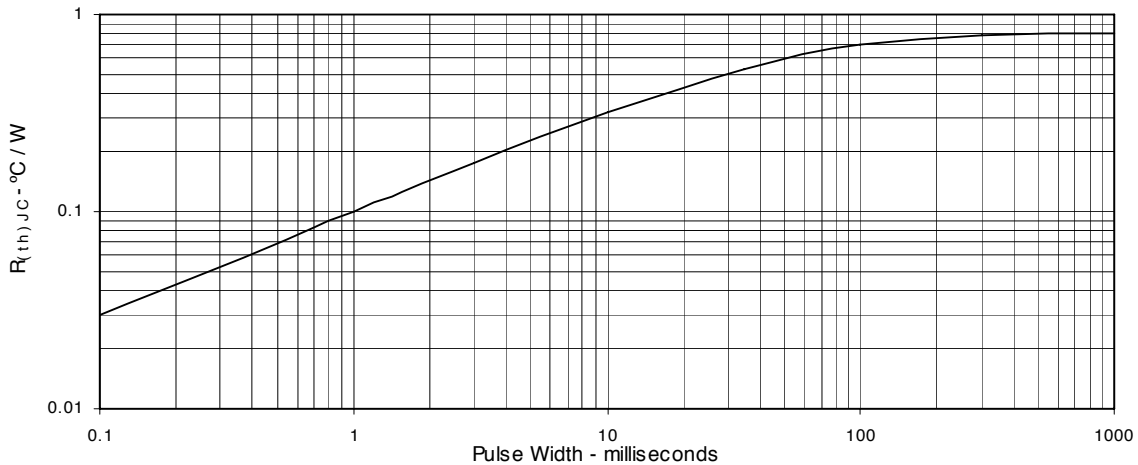


Fig. 11. Maximum Transient Thermal Resistance



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	4,850,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405 B2	6,759,692
	4,881,106	5,034,796	5,187,117	5,486,715	6,306,728 B1	6,583,505	6,710,463	6,771,478 B2

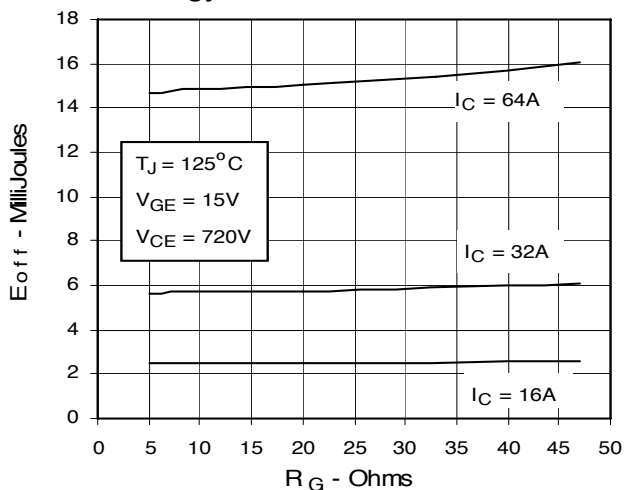
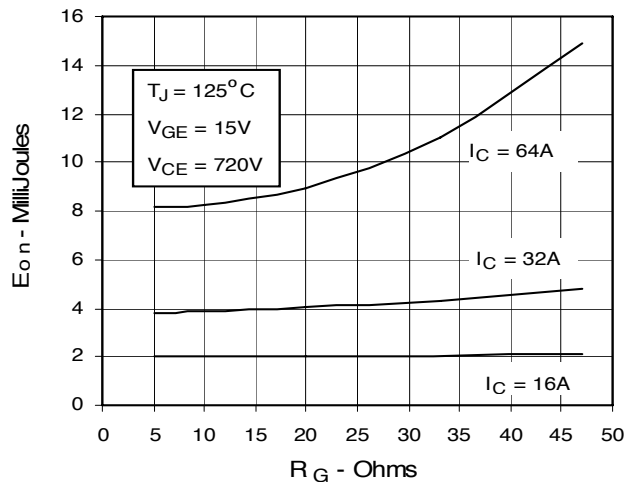
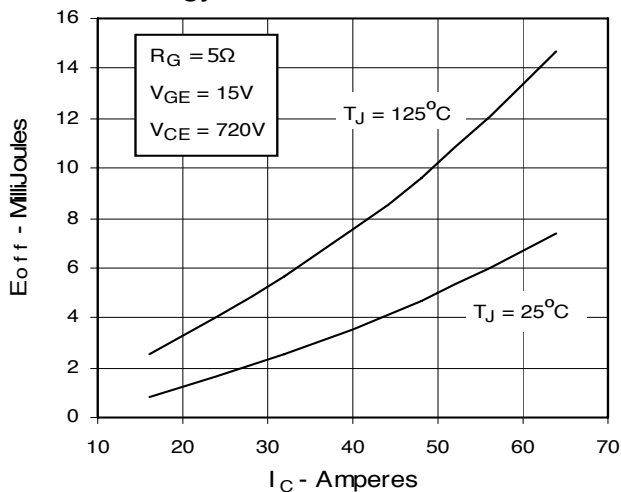
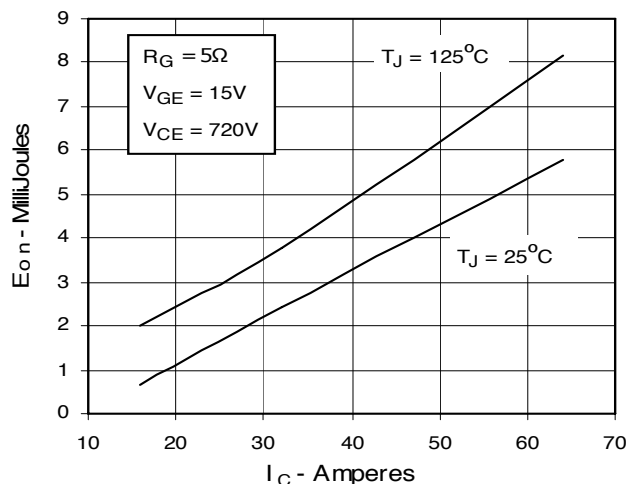
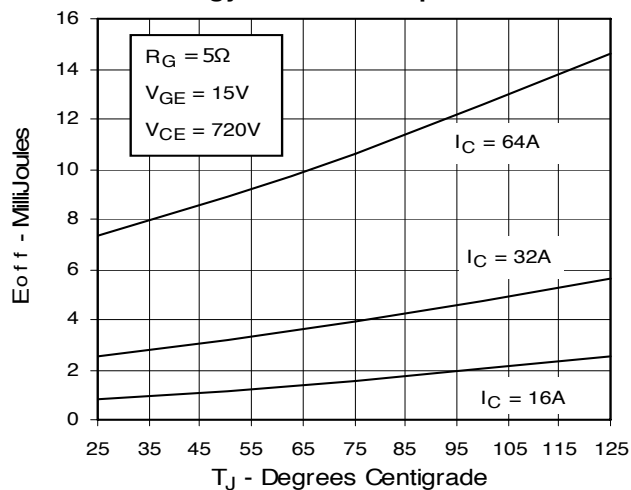
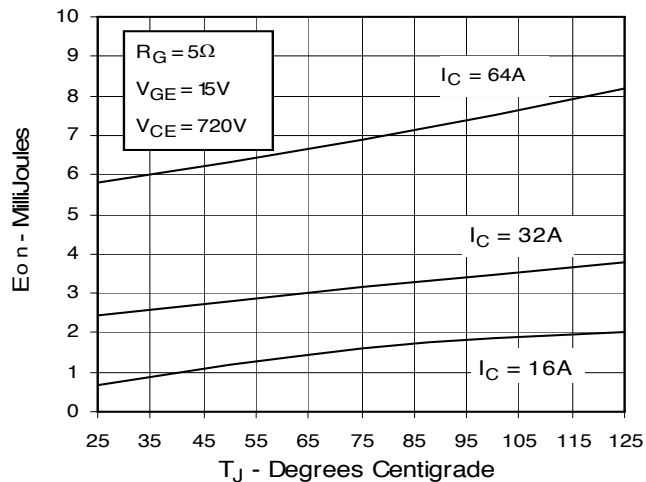
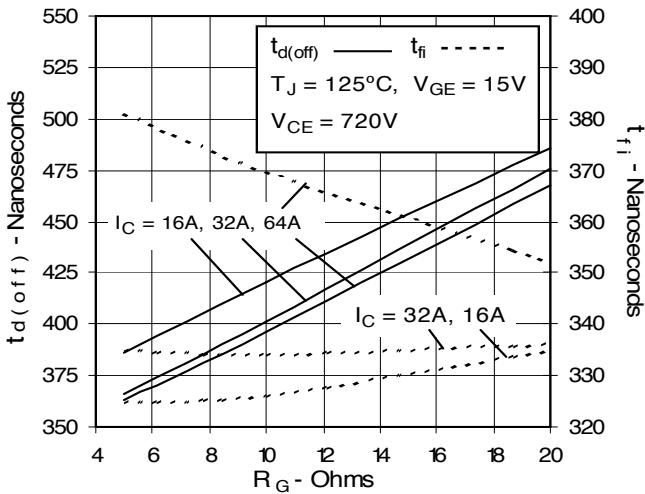
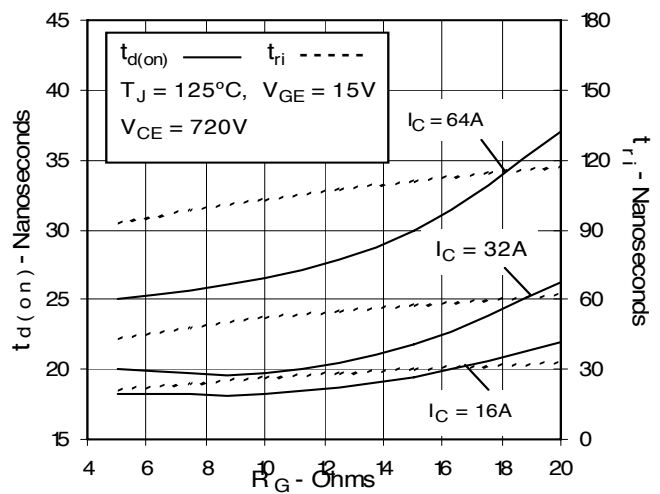
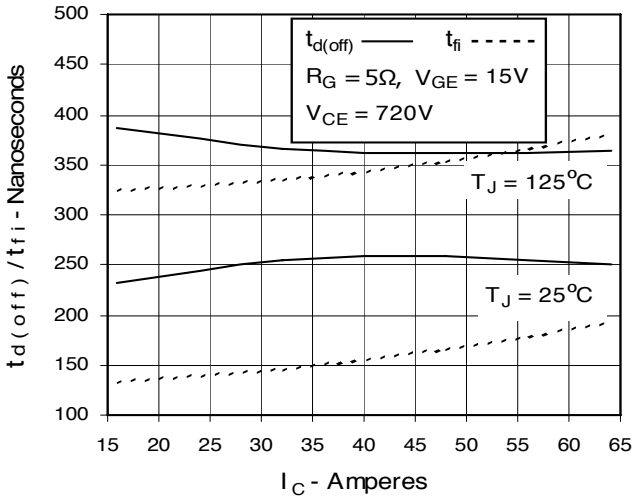
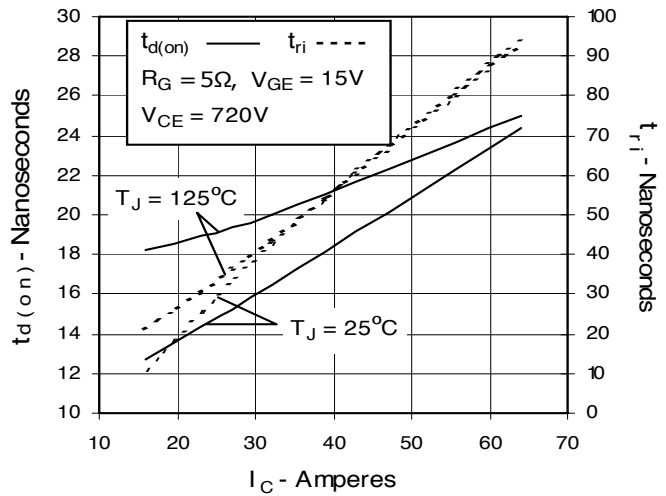
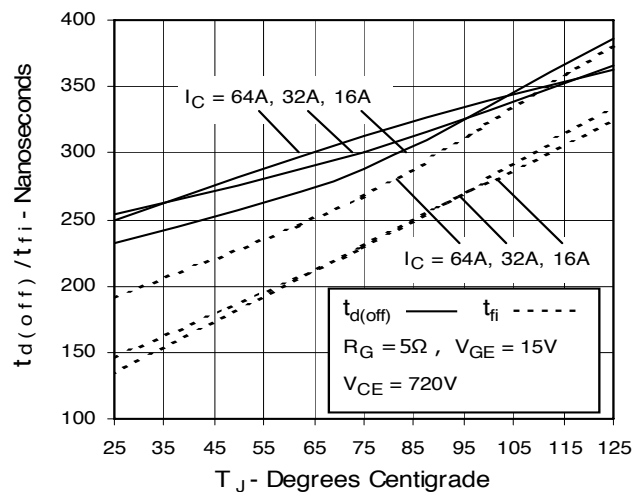
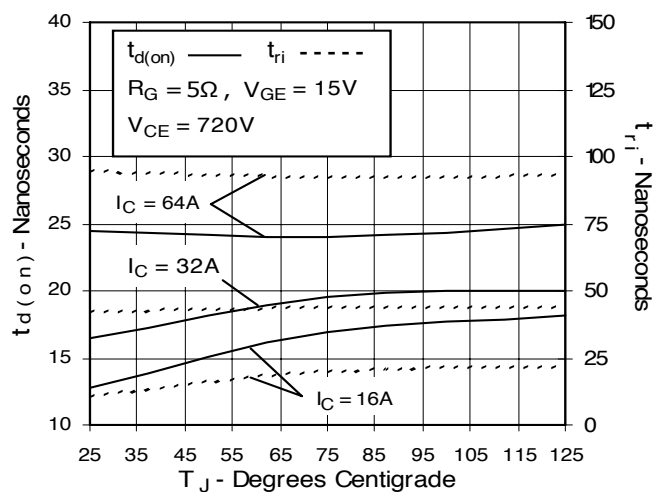
Fig. 12. Dependence of Turn-off Energy Loss on Gate Resistance

Fig. 13. Dependence of Turn-on Energy Loss on Gate Resistance

Fig. 14. Dependence of Turn-off Energy Loss on Collector Current

Fig. 15. Dependence of Turn-on Energy Loss on Collector Current

Fig. 16. Dependence of Turn-off Energy Loss on Temperature

Fig. 17. Dependence of Turn-on Energy Loss on Temperature


Fig. 18. Dependence of Turn-off Switching Time on Gate Resistance

Fig. 19. Dependence of Turn-on Switching Time on Gate Resistance

Fig. 20. Dependence of Turn-off Switching Time on Collector Current

Fig. 21. Dependence of Turn-on Switching Time on Collector Current

Fig. 22. Dependence of Turn-off Switching Time on Temperature

Fig. 23. Dependence of Turn-on Switching Time on Temperature


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	4,850,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405 B2	6,759,692
	4,881,106	5,034,796	5,187,117	5,486,715	6,306,728 B1	6,583,505	6,710,463	6,771,478 B2

Ultrafast Diode Characteristics

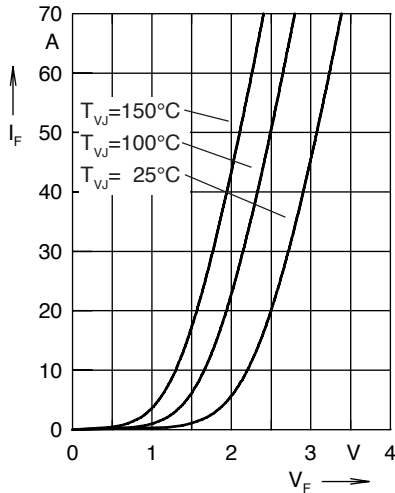


Fig. 24. Forward current I_F versus V_F

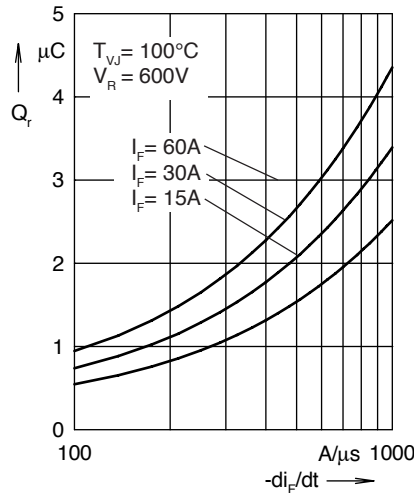


Fig. 25. Reverse recovery charge Q_r versus $-di_F/dt$

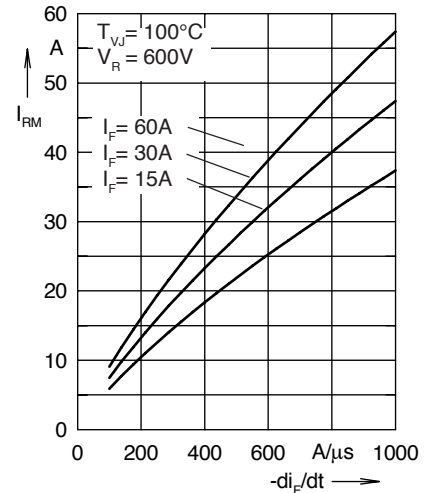


Fig. 26. Peak reverse current I_{RM} versus $-di_F/dt$

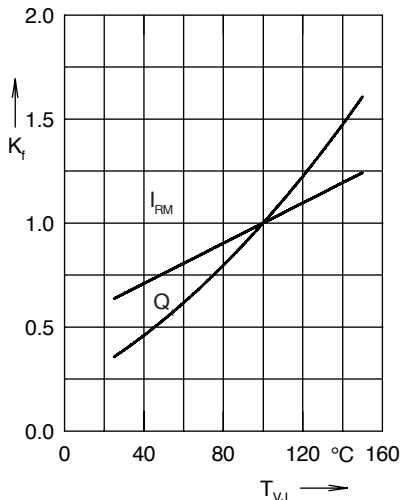


Fig. 27. Dynamic parameters Q_r , I_{RM} versus T_{VJ}

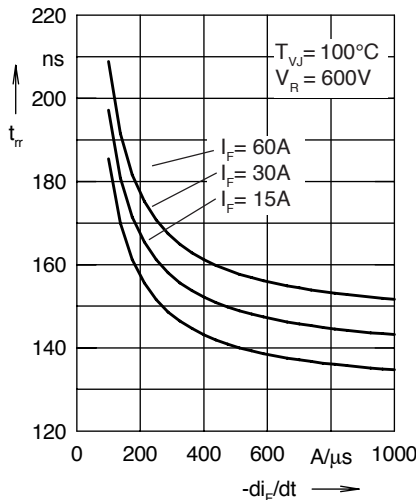


Fig. 28. Recovery time t_{tr} versus $-di_F/dt$

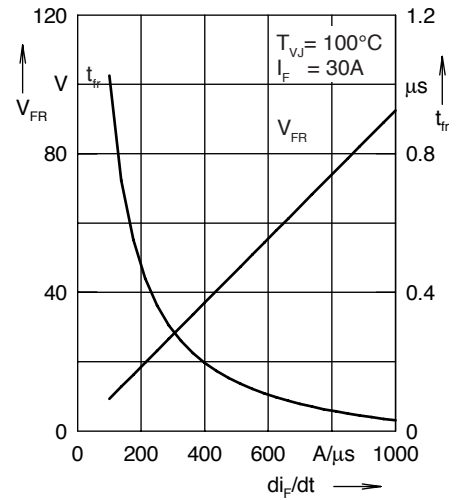


Fig. 29. Peak forward voltage V_{FR} and t_{tr} versus di_F/dt

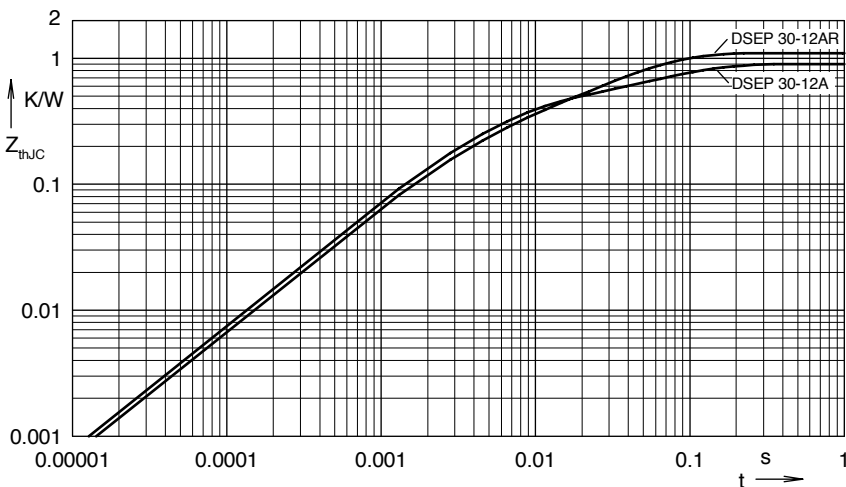


Fig. 30. Transient thermal resistance junction-to-case

Constants for Z_{thJC} calculation for non-isolated diode (DSEP 30-12A):

i	R_{thi} (K/W)	t_i (s)
1	0.465	0.0052
2	0.179	0.0003
3	0.256	0.0397

Constants for Z_{thJC} calculation for isolated diode (DSEP 30-12AR):

i	R_{thi} (K/W)	t_i (s)
1	0.368	0.0052
2	0.1417	0.0003
3	0.0295	0.0004
4	0.5604	0.0092