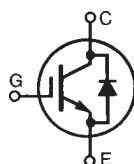


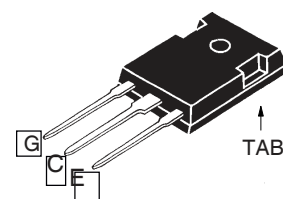
Medium speed low V<sub>sat</sub> PT  
IGBT for 5-40kHz switching



$V_{CES} = 600V$   
 $I_{C110} = 36A$   
 $V_{CE(sat)} \leq 1.8V$

Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ C$ to $150^\circ C$	600	V
$V_{CGR}$	$T_J = 25^\circ C$ to $150^\circ C$ , $R_{GE} = 1M\Omega$	600	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C110}$	$T_C = 110^\circ C$	36	A
$I_{F110}$	$T_C = 110^\circ C$	10	A
$I_{CM}$	$T_C = 25^\circ C$ , 1ms	200	A
<b>SSOA</b> <b>(RBSOA)</b>	$V_{GE} = 15V$ , $T_J = 125^\circ C$ , $R_G = 5\Omega$ Clamped inductive load @ $V_{CE} \leq 600V$	$I_{CM} = 80$	A
$P_C$	$T_C = 25^\circ C$	250	W
$T_J$		-55 ... +150	$^\circ C$
$T_{JM}$		150	$^\circ C$
$T_{stg}$		-55 ... +150	$^\circ C$
$M_d$	Mounting torque	1.13/10	Nm/lb.in.
$T_L$	Maximum lead temperature for soldering	300	$^\circ C$
$T_{SOLD}$	1.6 mm (0.062 in.) from case for 10s	260	$^\circ C$
<b>Weight</b>		6	g

TO-247 AD (IXGH)



G = Gate      C = Collector  
E = Emitter    TAB = Collector

### Features

- Optimized for low conduction and switching losses
- Square RBSOA
- Anti-parallel ultra fast diode
- International standard package

### Advantages

- High power density
- Low gate drive requirement

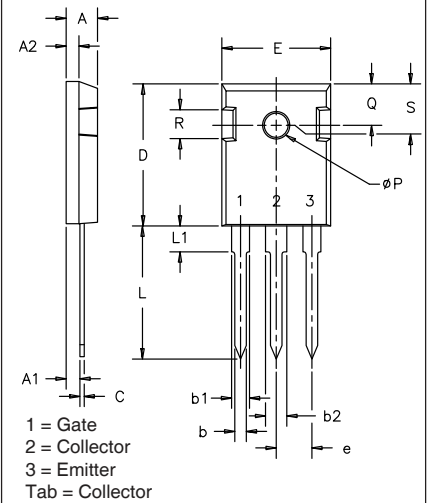
### Applications

- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts

Symbol	Test Conditions ( $T_J = 25^\circ C$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{CES}$	$I_C = 250\mu A$ , $V_{GE} = 0V$	600		V
$V_{GE(th)}$	$I_C = 250\mu A$ , $V_{CE} = V_{GE}$	3.0		V
$I_{CES}$	$V_{CE} = V_{CES}$ $V_{GE} = 0V$ $T_J = 125^\circ C$			75 $\mu A$
				500 $\mu A$
$I_{GES}$	$V_{CE} = 0V$ , $V_{GE} = \pm 20V$			$\pm 100$ nA
$V_{CE(sat)}$	$I_C = 30A$ , $V_{GE} = 15V$ , Note 1	1.5	1.8	V

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$g_{fs}$	$I_C = 30\text{A}, V_{CE} = 10\text{V}$ , Note 1	28	42	S
$C_{ies}$	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		2280	pF
$C_{oes}$			120	pF
$C_{res}$			32	pF
$Q_g$	$I_C = 30\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$		80	nC
$Q_{ge}$			12	nC
$Q_{gc}$			36	nC
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = 30\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 400\text{V}, R_G = 5\Omega$		19	ns
$t_{ri}$			24	ns
$E_{on}$			0.54	mJ
$t_{d(off)}$			125	200 ns
$t_{fi}$			100	160 ns
$E_{off}$			0.80	1.5 mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b> $I_C = 30\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 400\text{V}, R_G = 5\Omega$		19	ns
$t_{ri}$			26	ns
$E_{on}$			0.90	mJ
$t_{d(off)}$			180	ns
$t_{fi}$			170	ns
$E_{off}$			1.50	mJ
$R_{thJC}$				0.50 $^\circ\text{C/W}$
$R_{thCK}$		0.21		$^\circ\text{C/W}$

### TO-247 (IXGH) AD Outline



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.185	.209	4.7	5.3
A1	.087	.102	2.2	2.54
A2	.059	.098	2.2	2.6
b	.040	.055	1.0	1.4
b1	.065	.084	1.65	2.13
b2	.113	.123	2.87	3.12
C	.016	.031	.4	.8
D	.819	.845	20.80	21.46
E	.610	.640	15.75	16.26
e	.215 BSC		5.45 BSC	
L	.780	.800	19.81	20.32
L1		.177		4.50
$\phi P$	.140	.144	3.55	3.65
Q	.212	.244	5.4	6.2
R	.170	.216	4.32	5.49
S	.242 BSC		6.15 BSC	

### Reverse Diode (FRED)

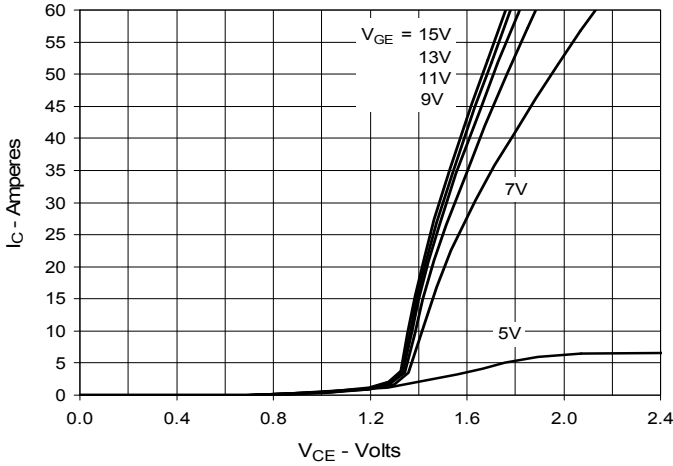
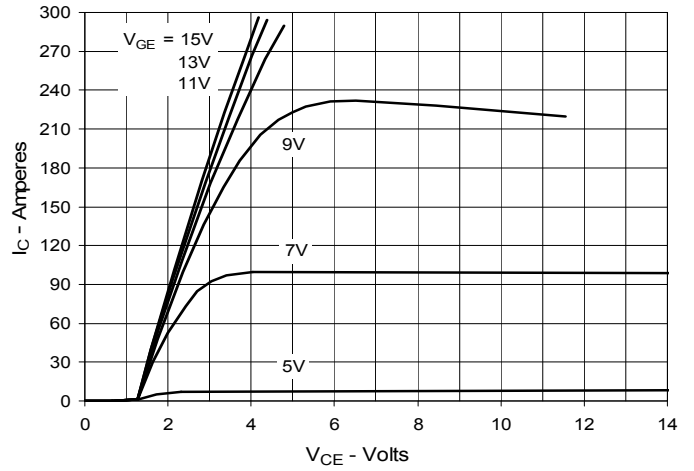
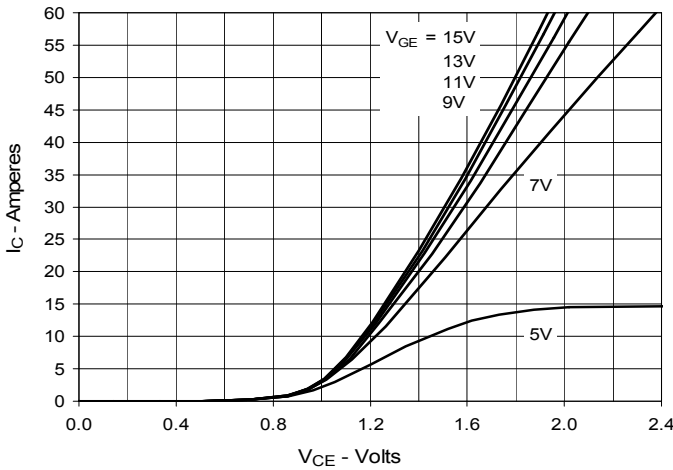
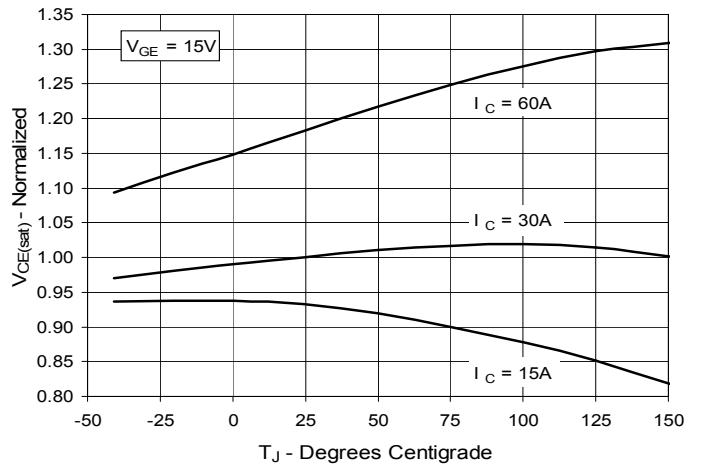
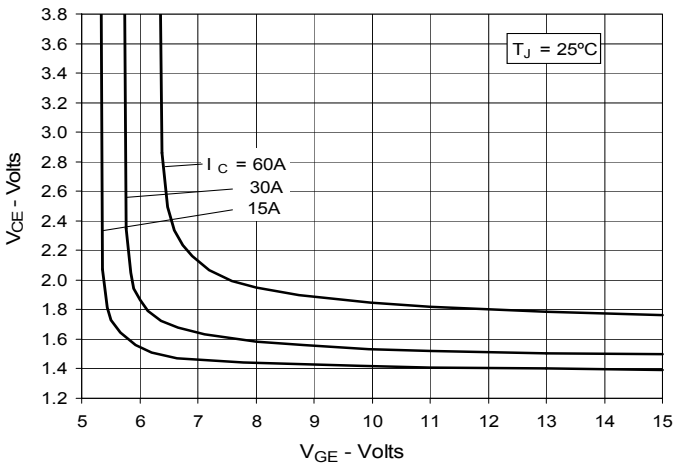
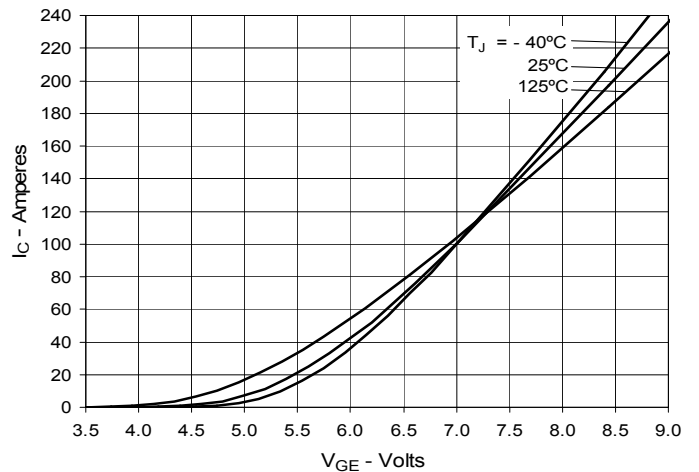
Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values			
		Min.	Typ.	Max.	
$V_F$	$I_F = 10\text{A}, V_{GE} = 0\text{V}$ , Note 1 $T_J = 150^\circ\text{C}$		1.7	3.0 V	
$t_{rr}$	$I_F = 10\text{A}, -di_F/dt = 200\text{A}/\mu\text{s}$ $V_R = 300\text{V}$		60	ns	
$I_{RM}$		$T_J = 25^\circ\text{C}$		3	A
		$T_J = 100^\circ\text{C}$		4	A
$R_{thJC}$				2.5 $^\circ\text{C/W}$	

Notes: 1. Pulse test,  $t \leq 300\mu\text{s}$ ; duty cycle,  $d \leq 2\%$ .

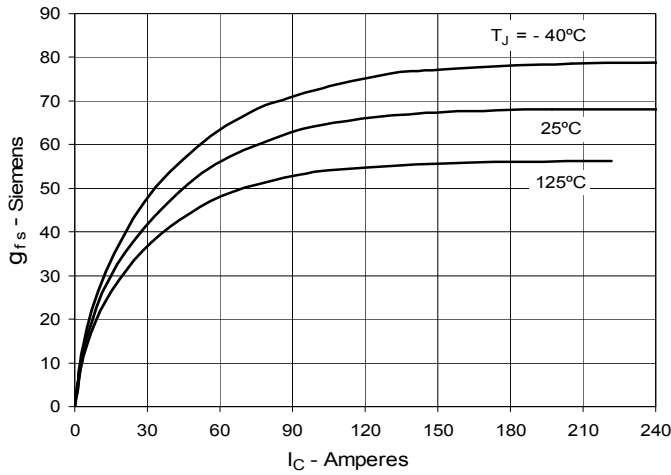
IXYS reserves the right to change limits, test conditions, and dimensions.

IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

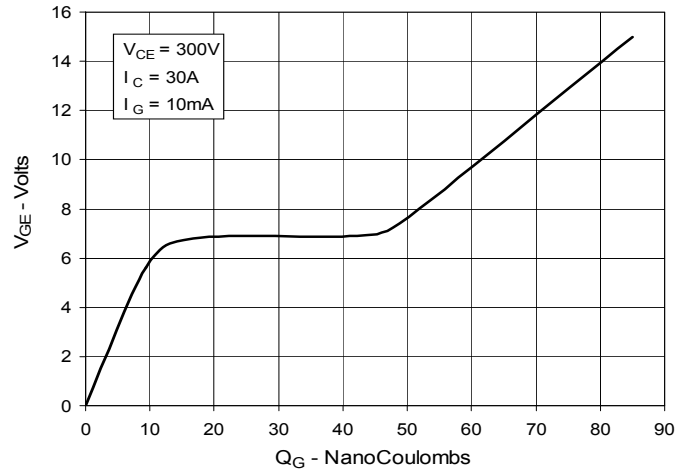
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4,850,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405 B2	6,759,692	7,063,975 B2	
4,881,106	5,034,796	5,187,117	5,486,715	6,306,728 B1	6,583,505	6,710,463	6,771,478 B2	7,071,537	

**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  
Junction Temperature**

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

**Fig. 6. Input Admittance**


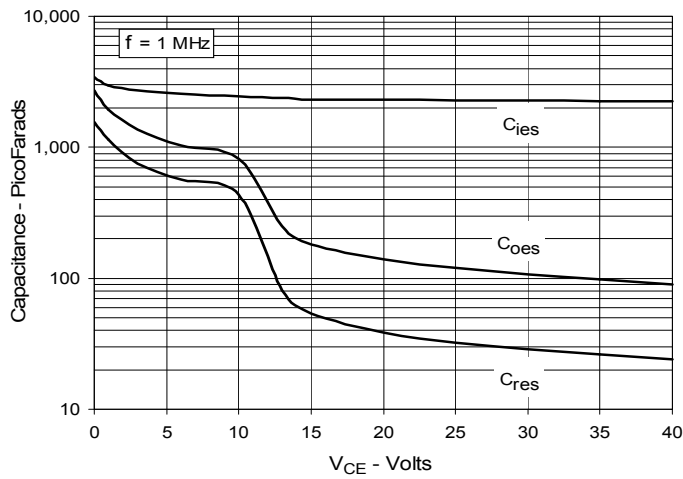
**Fig. 7. Transconductance**



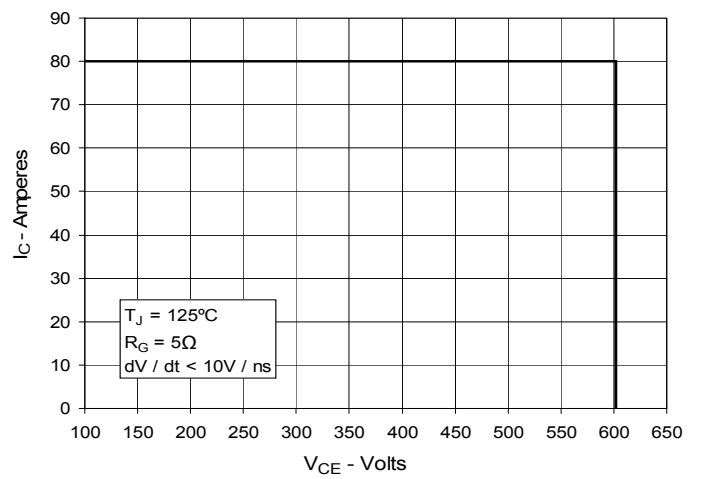
**Fig. 8. Gate Charge**



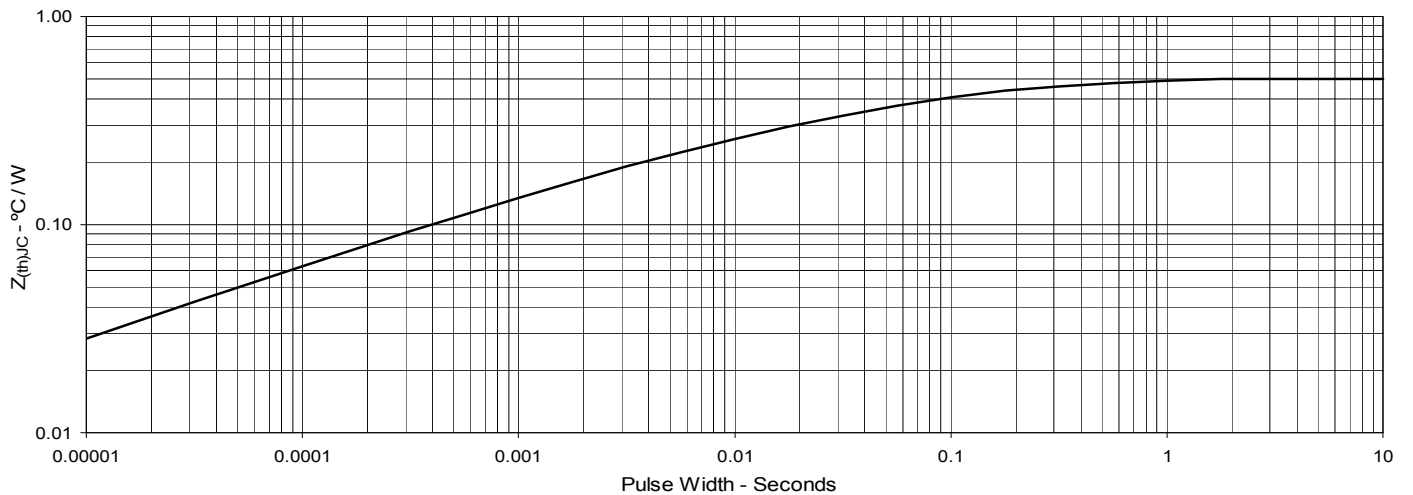
**Fig. 9. Capacitance**

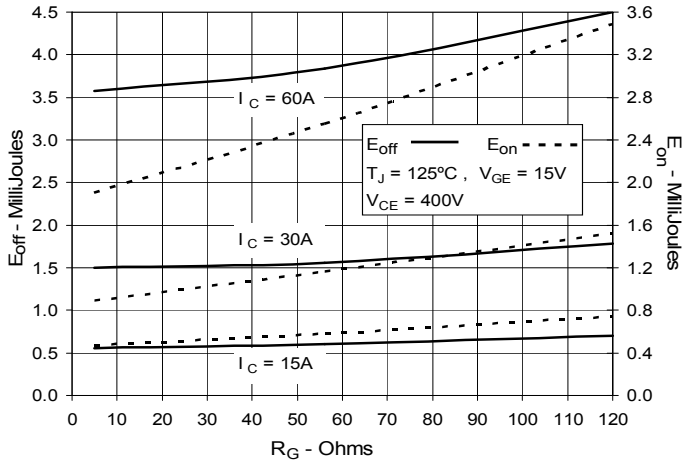
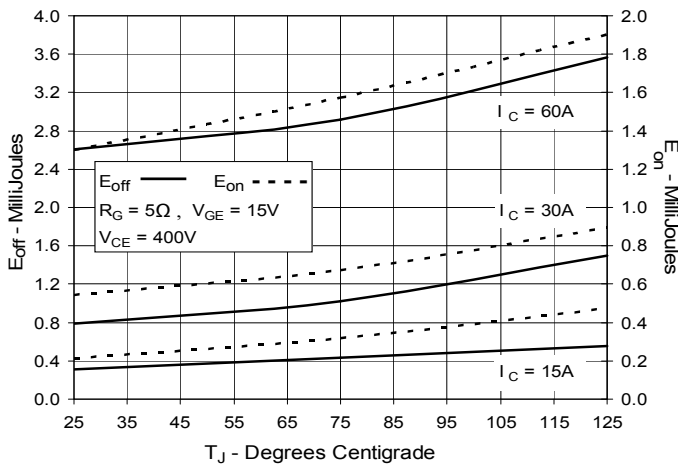
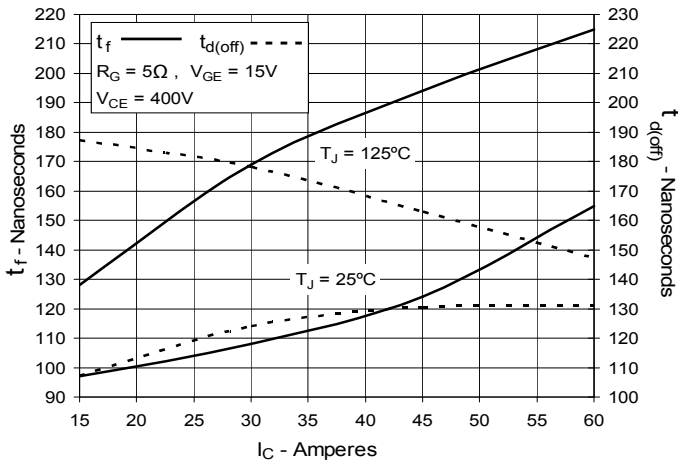
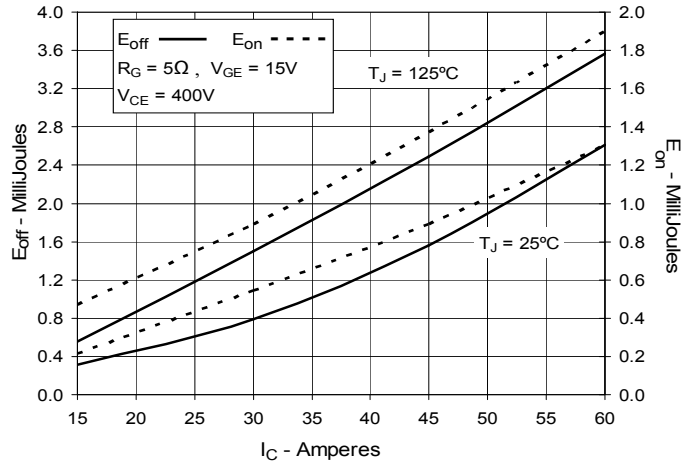
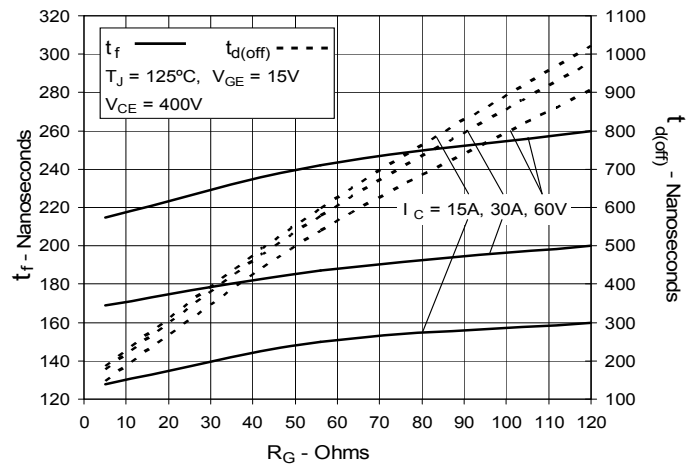
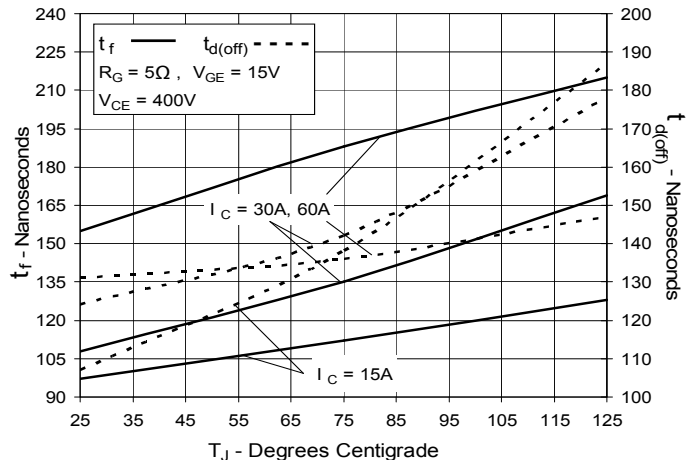


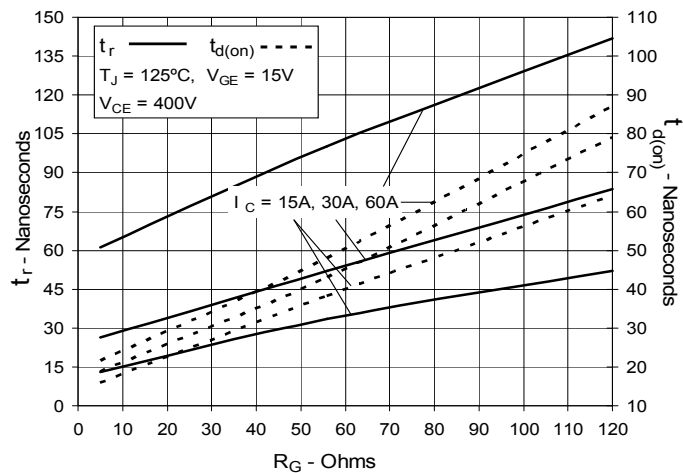
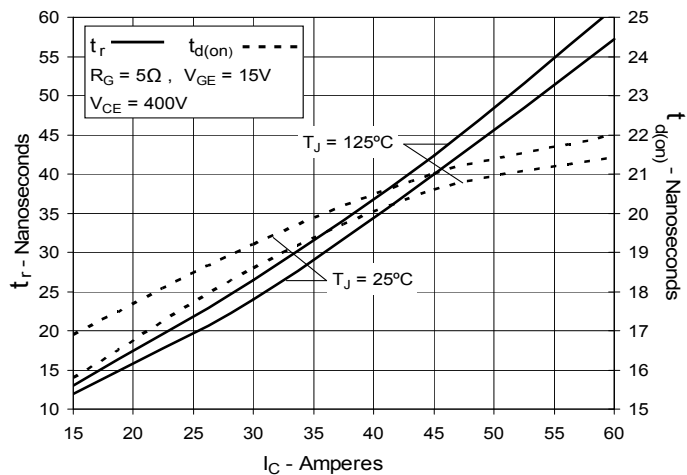
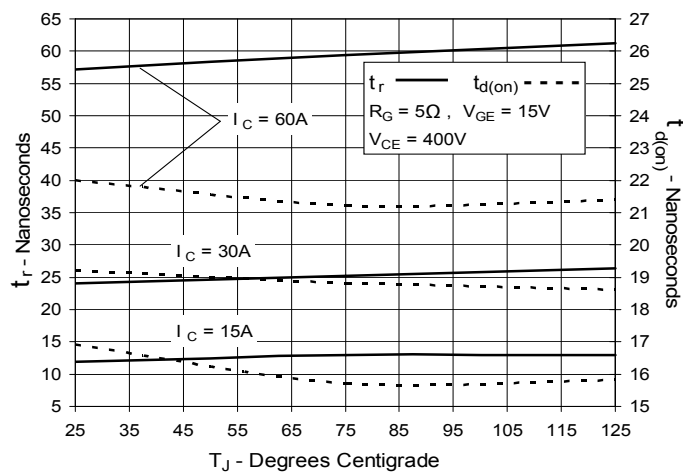
**Fig. 10. Reverse-Bias Safe Operating Area**



**Fig. 11. Maximum Transient Thermal Impedance**



**Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance**

**Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature**

**Fig. 16. Inductive Turn-off Switching Times vs. Collector Current**

**Fig. 13. Inductive Switching Energy Loss vs. Collector Current**

**Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance**

**Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature**


**Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance**

**Fig. 19. Inductive Turn-on Switching Times vs. Collector Current**

**Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature**


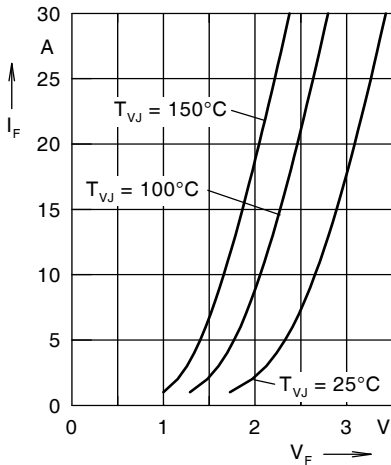


Fig. 21. Forward current  $I_F$  versus  $V_F$

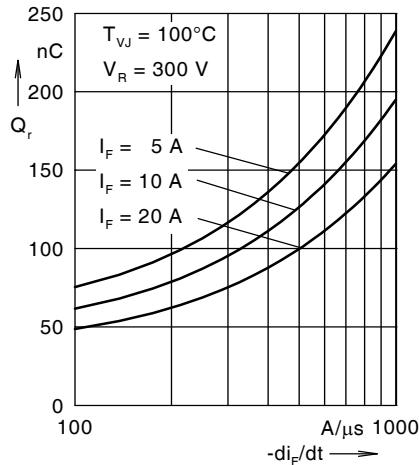


Fig. 22. Reverse recovery charge  $Q_r$

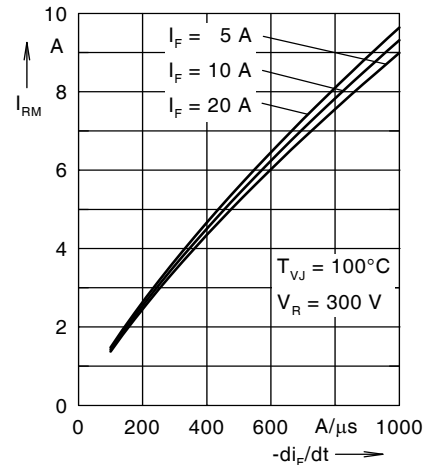


Fig. 23. Peak reverse current  $I_{RM}$

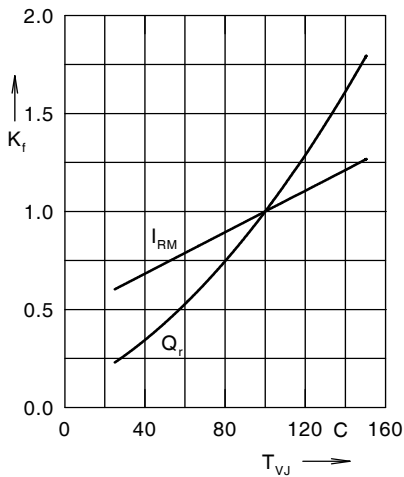


Fig. 24. Dynamic parameters  $Q_r$ ,  $I_{RM}$

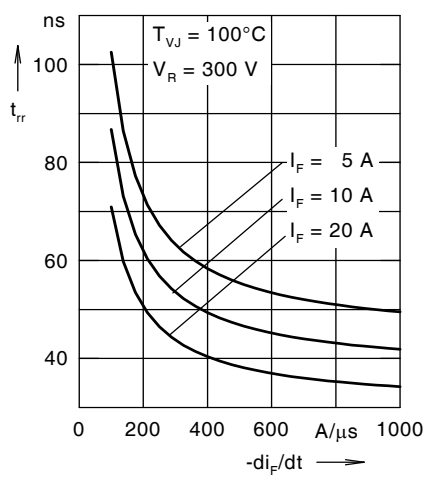


Fig. 25. Recovery time  $t_{rr}$  versus  $-di_F/dt$

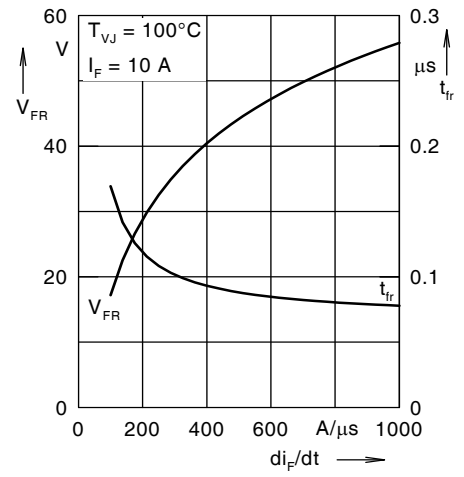


Fig. 26. Peak forward voltage  $V_{FR}$  and  $t_{rr}$

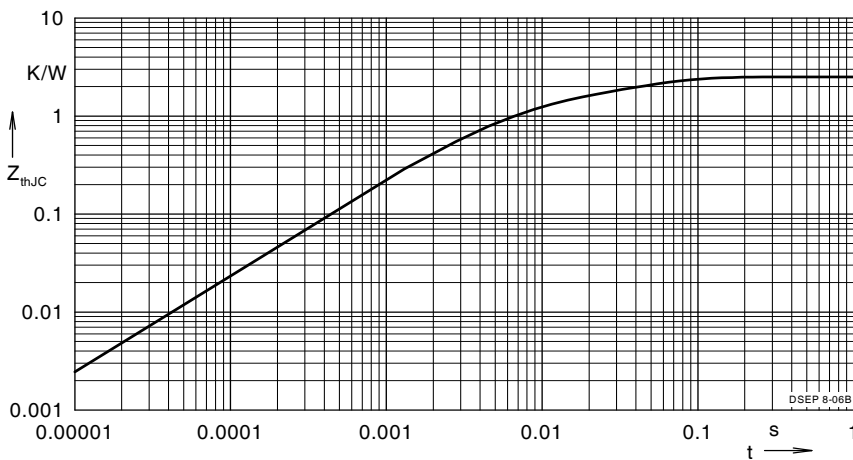


Fig. 27. Transient thermal resistance junction-to-case

NOTE: Fig. 2 to Fig. 6 shows typical values

Constants for  $Z_{thJC}$  calculation:

i	$R_{thi}$ (K/W)	$t_i$ (s)
1	1.449	0.0052
2	0.5578	0.0003



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