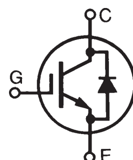
IXYS Preliminary Technical Information

High Voltage, High Frequency, BiMOSFET™ Monolithic Bipolar MOS Transistor

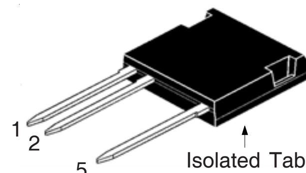
IXBF20N360

V_{CES} = 3600V
I_{C110} = 18A
$V_{CE(sat)}$ ≤ 3.4V

(Electrically Isolated Tab)



ISOPLUS i4-Pak™



1 = Gate
2 = Emitter
5 = Collector

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	3600	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ	3600	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	T_C = 25°C	45	A
I_{C110}	T_C = 110°C	18	A
I_{CM}	T_C = 25°C, 1ms	220	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 125°C, R_G = 10Ω Clamped Inductive Load	I_{CM} = 160 V_{CES} ≤ 1500	A V
t_{SC} (SCSOA)	V_{GE} = 15V, T_J = 125°C, R_G = 52Ω, V_{CE} = 1500V, Non-Repetitive	10	μs
P_C	T_C = 25°C	230	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	Plastic Body for 10s	260	°C
F_C	Mounting Force with Clip	20..120 / 4.5..27	N/lb
V_{ISOL}	50/60Hz, 5 Seconds	4000	V~
Weight		8	g

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 250μA, V_{GE} = 0V	3600			V
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}	3.0		5.0	V
I_{CES}	V_{CE} = 3000V, V_{GE} = 0V			25	μA
	Note 2, T_J = 125°C		125		μA
I_{GES}	V_{CE} = 0V, V_{GE} = ± 20V			±200	nA
$V_{CE(SAT)}$	I_C = 20A, V_{GE} = 15V, Note 1		2.9	3.4	V
	T_J = 125°C		3.6		V

Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 4000V~ Electrical Isolation
- High Blocking Voltage
- High Frequency Operation

Advantages

- Low Gate Drive Requirement
- High Power Density

Applications

- Switch-Mode and Resonant-Mode Power Supplies
- Uninterruptible Power Supplies (UPS)
- Laser Generators
- Capacitor Discharge Circuits
- AC Switches

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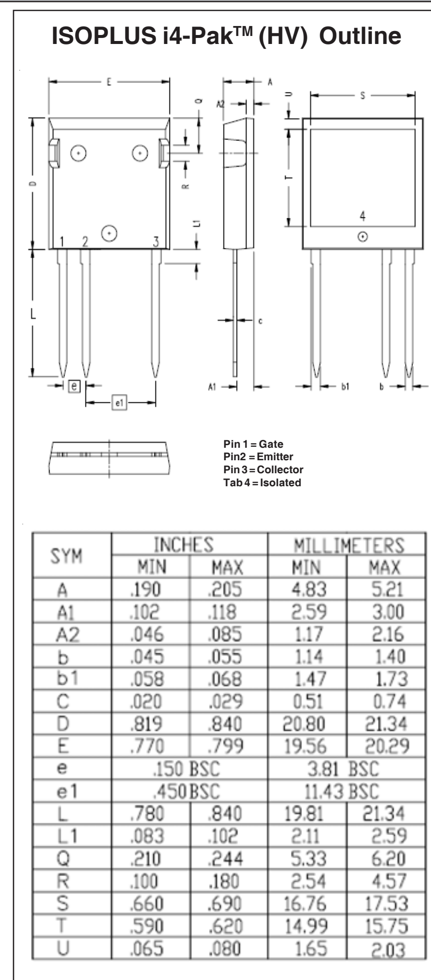
Symbol	Test Conditions ($T_J = 25°C$ Unless Otherwise Specified)	Min.	Typ.	Max.	
g_{fs}	$I_C = 20A$, $V_{CE} = 10V$, Note 1	10	17		S
C_{ies}	$V_{CE} = 25V$, $V_{GE} = 0V$, f = 1MHz		2045		pF
C_{oes}			110		pF
C_{res}			50		pF
$Q_{g(on)}$	$I_C = 20A$, $V_{GE} = 15V$, $V_{CE} = 1000V$		110		nC
Q_{ge}			13		nC
Q_{gc}			43		nC
$t_{d(on)}$	**Inductive load, $T_J = 25°C$** $I_C = 20A$, $V_{GE} = 15V$ $V_{CE} = 1500V$, $R_G = 10\Omega$ Note 3		18		ns
t_{ri}			14		ns
E_{on}			15.50		mJ
$t_{d(off)}$			238		ns
t_{fi}			206		ns
E_{off}			4.30		mJ
$t_{d(on)}$	**Inductive load, $T_J = 125°C$** $I_C = 20A$, $V_{GE} = 15V$ $V_{CE} = 1500V$, $R_G = 10\Omega$ Note 3		20		ns
t_{ri}			22		ns
E_{on}			16.10		mJ
$t_{d(off)}$			247		ns
t_{fi}			216		ns
E_{off}			4.15		mJ
$t_{d(on)}$	**Resistive load, $T_J = 25°C$** $I_C = 20A$, $V_{GE} = 15V$ $V_{CE} = 960V$, $R_G = 10\Omega$		30		ns
t_r			325		ns
$t_{d(off)}$			165		ns
t_f			1045		ns
$t_{d(on)}$	**Resistive load, $T_J = 125°C$** $I_C = 20A$, $V_{GE} = 15V$ $V_{CE} = 960V$, $R_G = 10\Omega$		32		ns
t_r			890		ns
$t_{d(off)}$			185		ns
t_f			1100		ns
R_{thJC}				0.54	°C/W
R_{thCS}			0.15		°C/W

ISOPLUS i4-Pak™ (HV) Outline



SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.190	.205	4.83	5.21
A1	.102	.118	2.59	3.00
A2	.046	.085	1.17	2.16
b	.045	.055	1.14	1.40
b1	.058	.068	1.47	1.73
C	.020	.029	0.51	0.74
D	.819	.840	20.80	21.34
E	.770	.799	19.56	20.29
e	.150 BSC		3.81 BSC	
e1	.450 BSC		11.43 BSC	
L	.780	.840	19.81	21.34
L1	.083	.102	2.11	2.59
Q	.210	.244	5.33	6.20
R	.100	.180	2.54	4.57
S	.660	.690	16.76	17.53
T	.590	.620	14.99	15.75
U	.065	.080	1.65	2.03

Reverse Diode

Symbol	Test Conditions ($T_J = 25°C$ Unless Otherwise Specified)	Min.	Typ.	Max	
V_F	$I_F = 20A$, $V_{GE} = 0V$, Note 1			3.5	V
t_{rr}	$I_F = 10A$, $V_{GE} = 0V$, $-di_F/dt = 100A/\mu s$ $V_R = 100V$, $V_{GE} = 0V$		1.7		μs
I_{RM}			35		A
Q_{RM}			30		μC

PRELIMANARY TECHNICAL INFORMATION

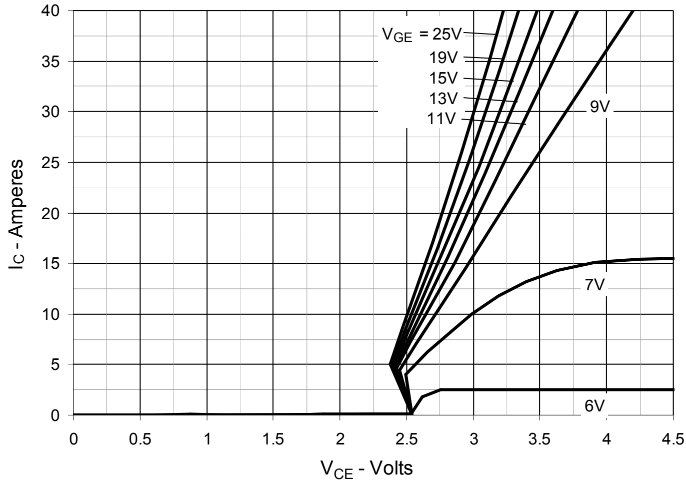
The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

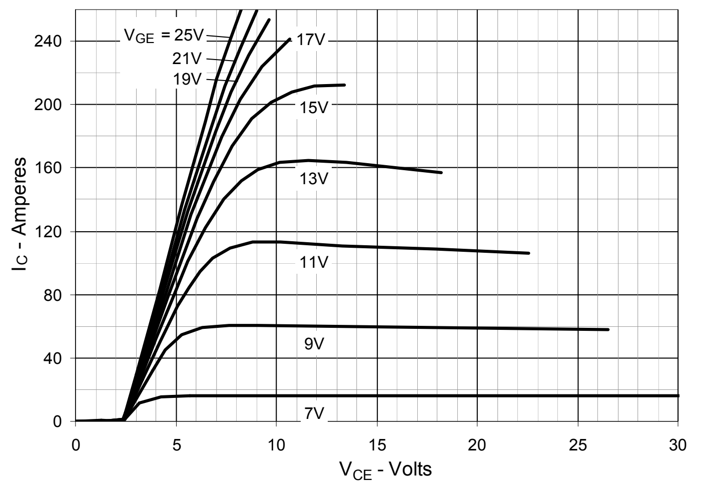
Notes:

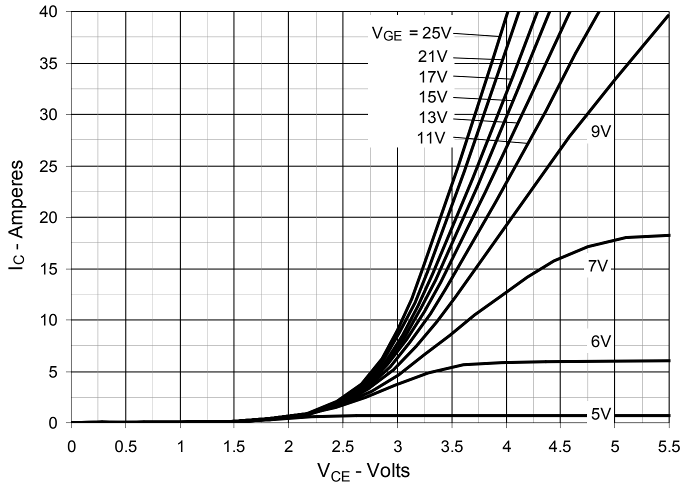
1. Pulse test, $t \leq 300\mu s$, duty cycle, $d \leq 2\%$.
2. Device must be heatsunk for high-temperature leakage current measurements to avoid thermal runaway.
3. Switching times & energy losses may increase for higher V_{CE}(clamp), T_J or R_G.

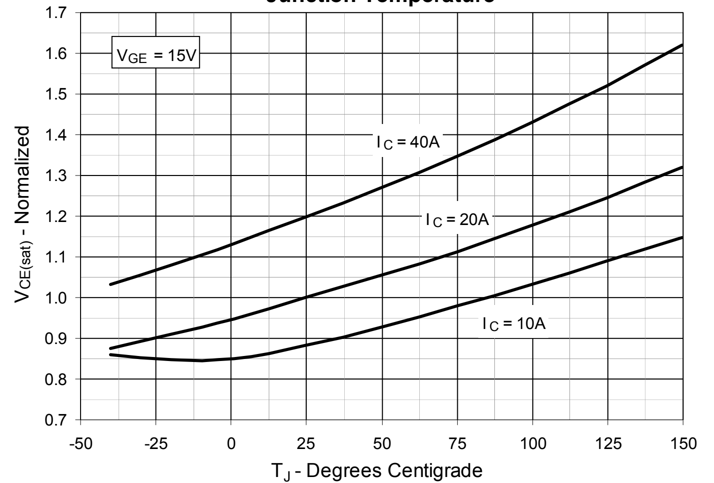
IXYS Reserves the Right to Change Limits, Test Conditions and Dimensions.

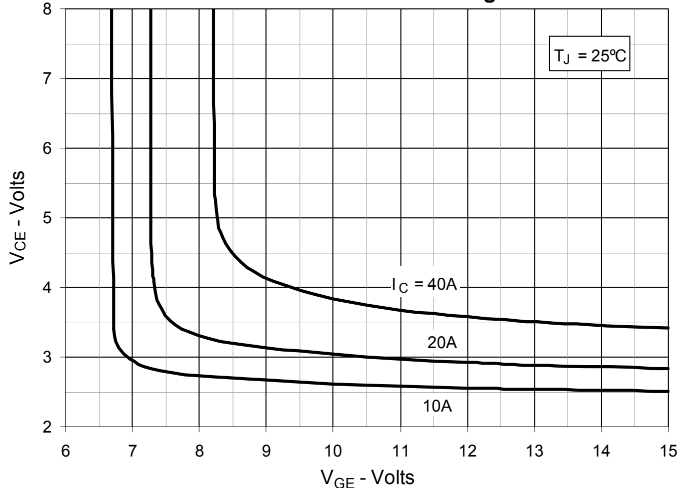
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents: 4,835,592 4,931,844 5,049,961 5,237,481 6,162,665 6,404,065 B1 6,683,344 6,727,585 7,005,734 B2 7,157,338B2 4,860,072 5,017,508 5,063,307 5,381,025 6,259,123 B1 6,534,343 6,710,405 B2 6,759,692 7,063,975 B2 4,881,106 5,034,796 5,187,117 5,486,715 6,306,728 B1 6,583,505 6,710,463 6,771,478 B2 7,071,537

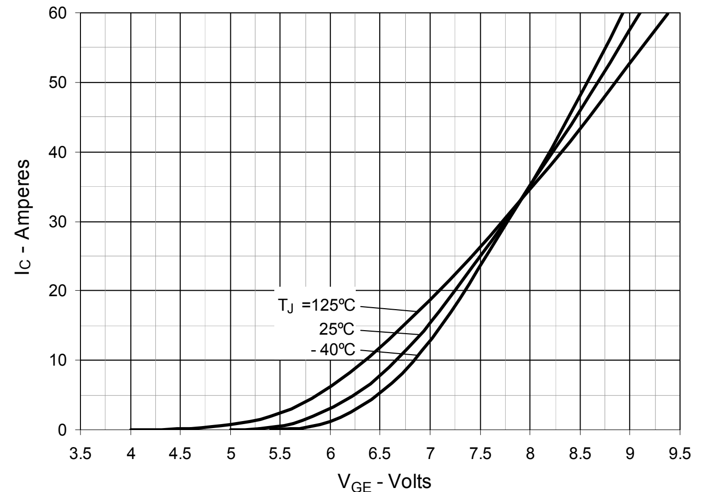












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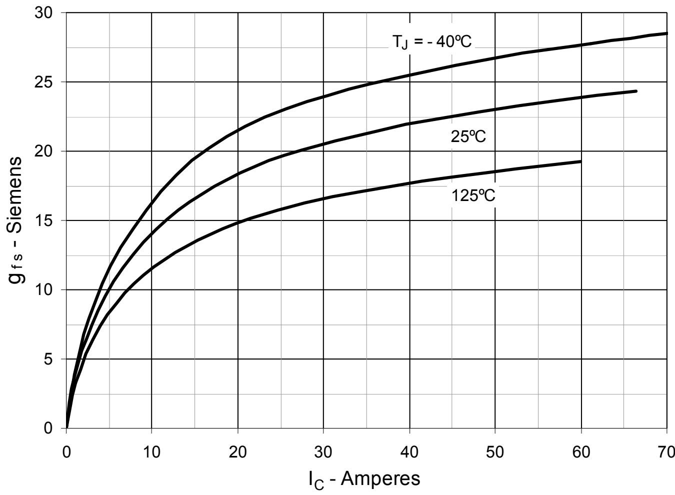

Fig. 7. Transconductance

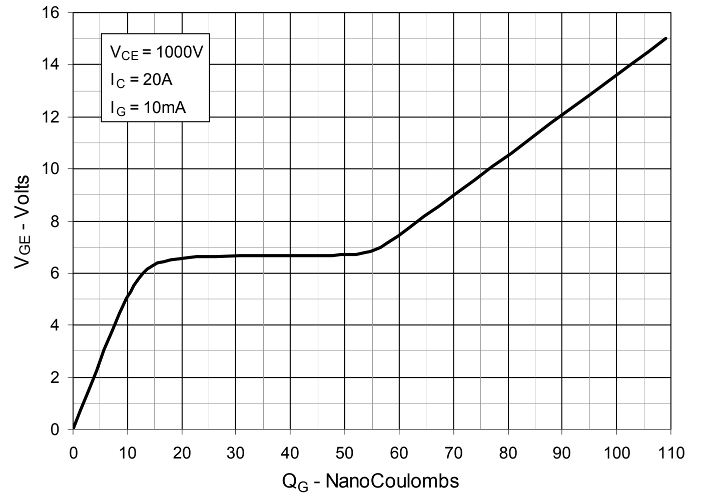

Fig. 8. Gate Charge

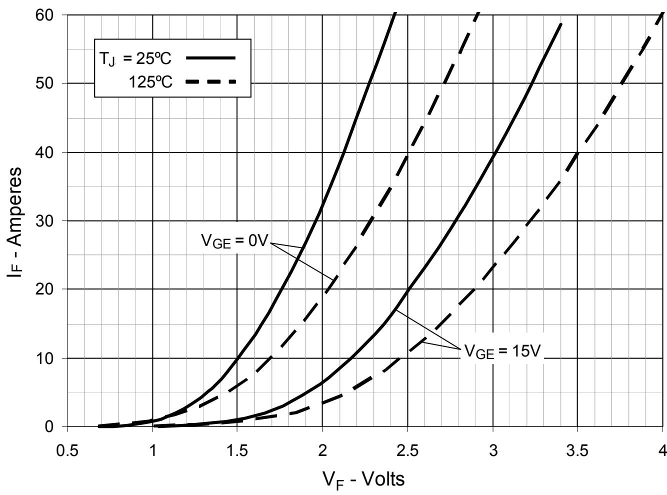

Fig. 9. Forward Voltage Drop of Intrinsic Diode

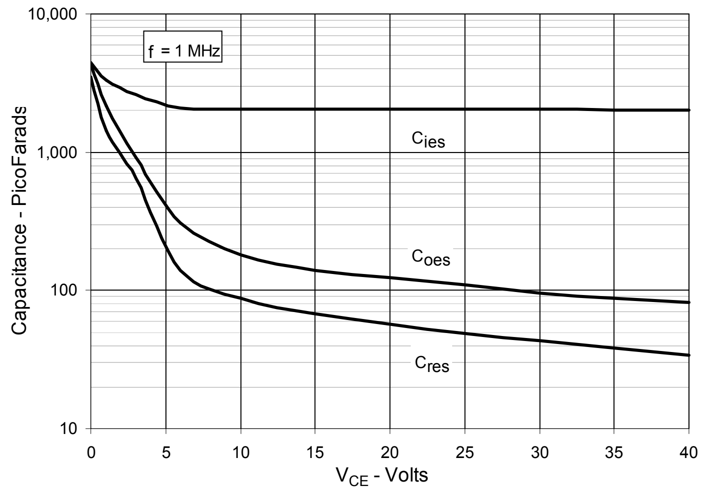

Fig. 10. Capacitance

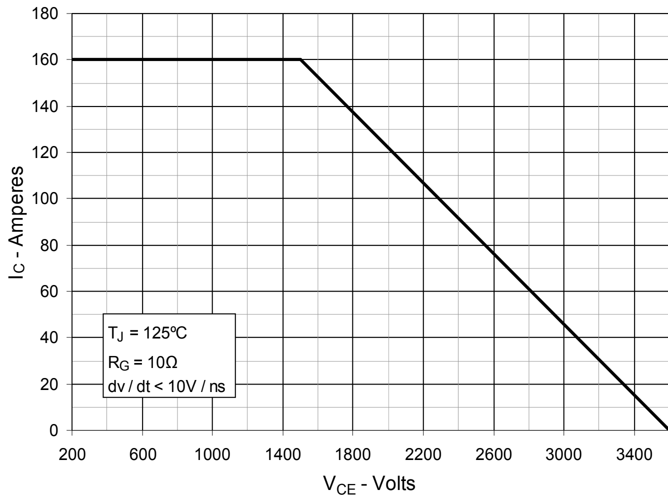

Fig. 11. Reverse-Bias Safe Operating Area

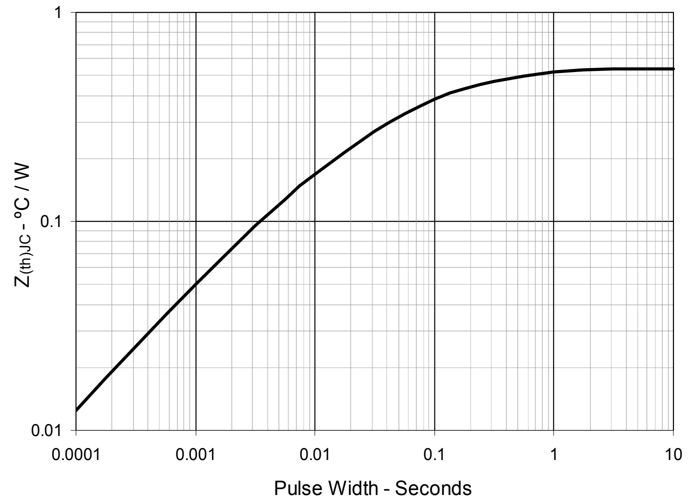

Fig. 12. Maximum Transient Thermal Impedance

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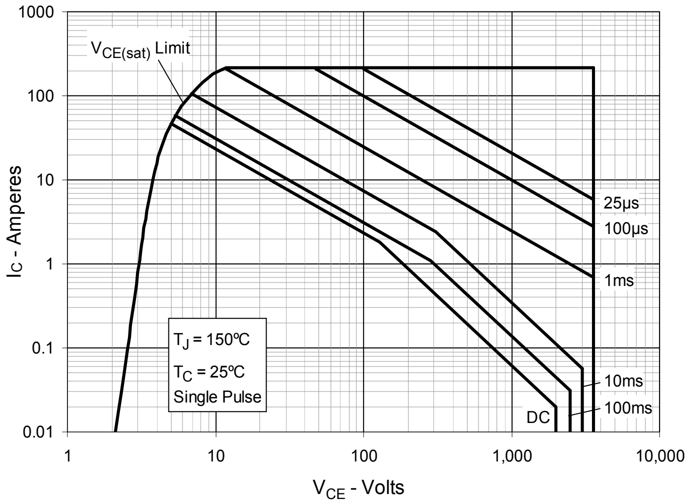

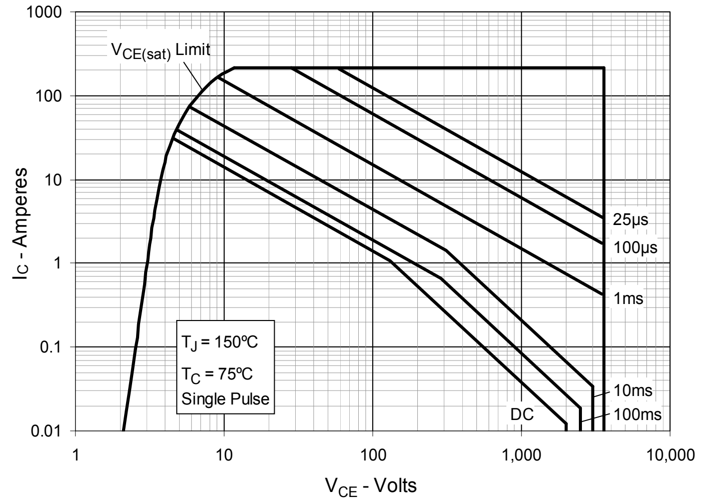

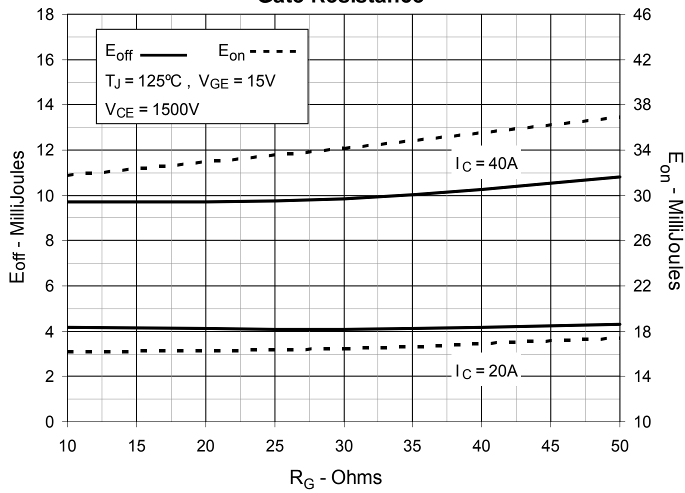

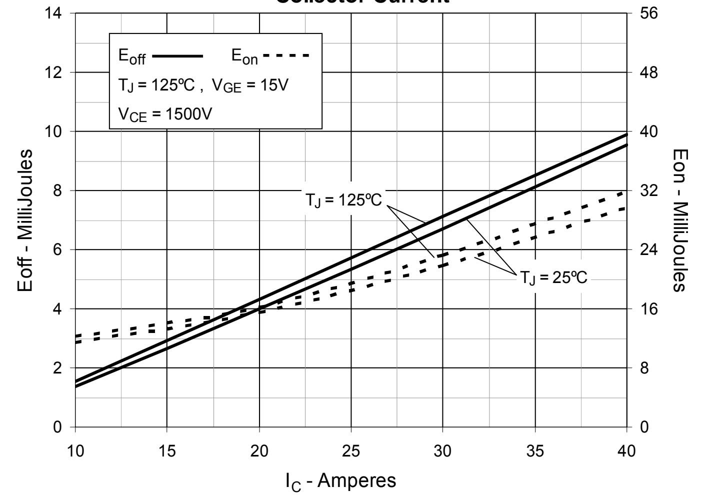

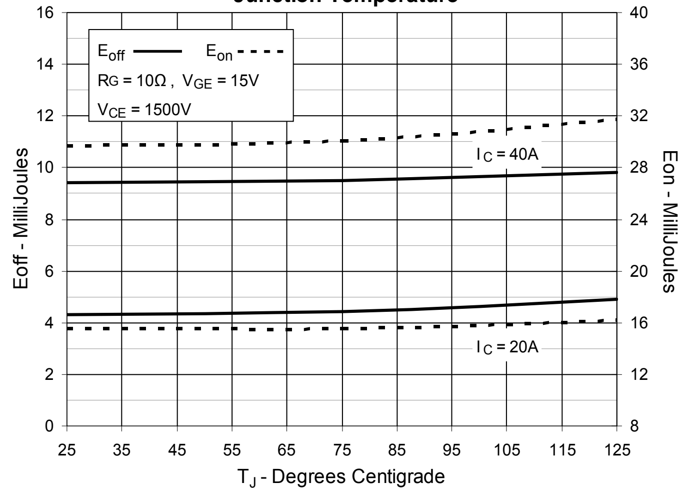

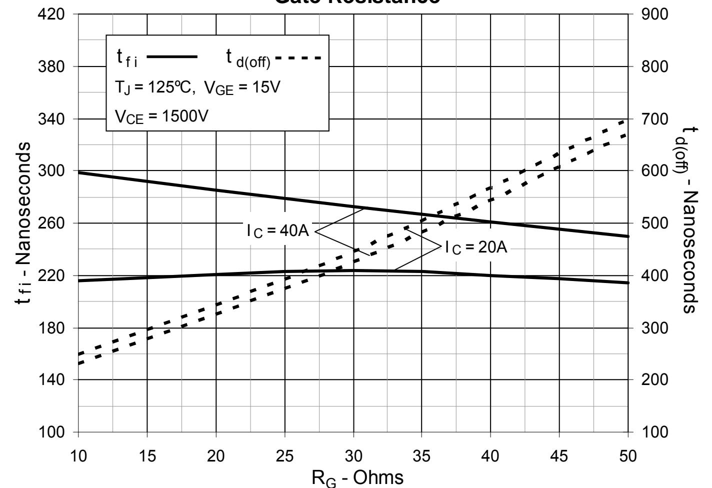

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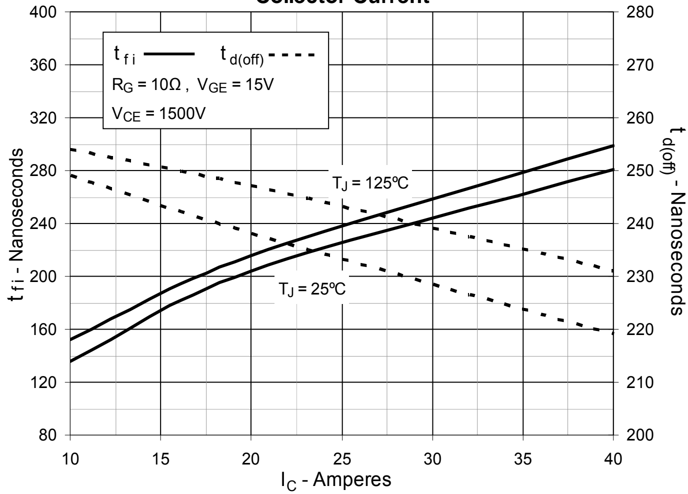

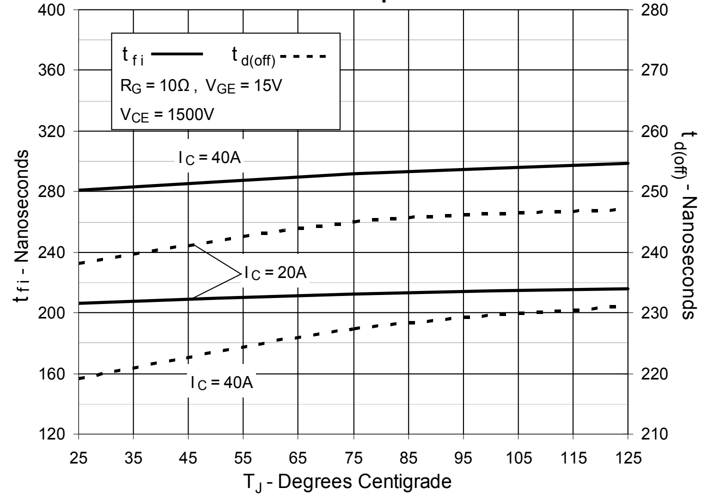

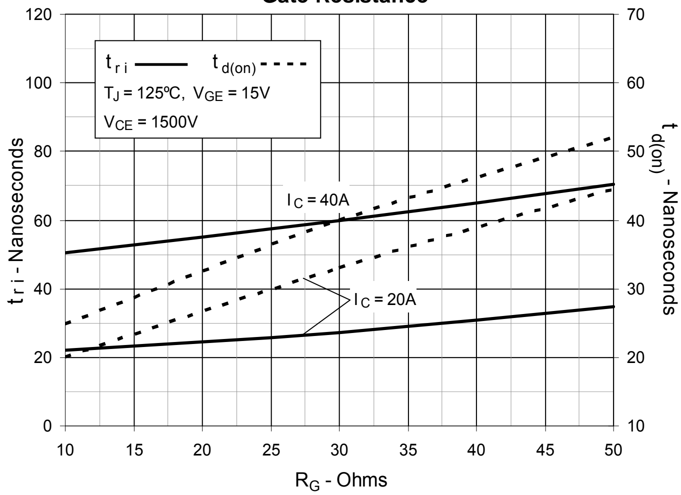

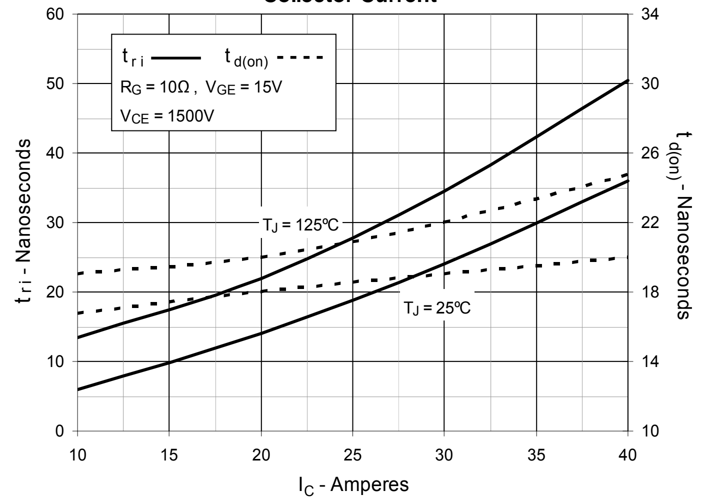

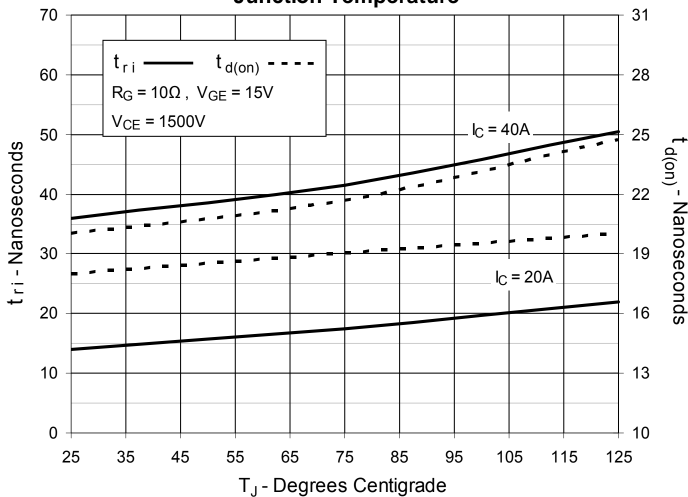

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