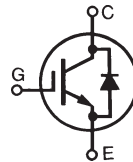


# High Voltage, High Gain BIMOSFET™ Monolithic Bipolar MOS Transistor

**IXBH 10N170**  
**IXBT 10N170**

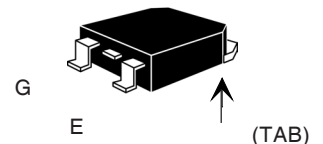
$V_{CES} = 1700 \text{ V}$   
 $I_{C25} = 20 \text{ A}$   
 $V_{CE(sat)} = 3.8 \text{ V}$

## Preliminary Data Sheet

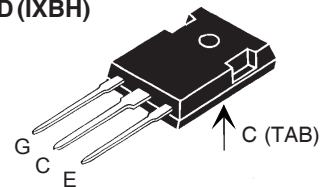


Symbol	Test Conditions	Maximum Ratings
$V_{CES}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$	1700 V
$V_{CGR}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GE} = 1 \text{ M}\Omega$	1700 V
$V_{GES}$	Continuous	$\pm 20$ V
$V_{GEM}$	Transient	$\pm 30$ V
$I_{C25}$	$T_C = 25^\circ\text{C}$	20 A
$I_{C90}$	$T_C = 90^\circ\text{C}$	10 A
$I_{CM}$	$T_C = 25^\circ\text{C}$ , 1 ms	40 A
<b>SSOA (RBSOA)</b>	$V_{GE} = 15 \text{ V}$ , $T_{VJ} = 125^\circ\text{C}$ , $R_G = 33 \Omega$ Clamped inductive load	$I_{CM} = 20 \text{ A}$ $V_{CES} = 1350 \text{ V}$
$P_C$	$T_C = 25^\circ\text{C}$	140 W
$T_J$		$-55 \dots +150$ $^\circ\text{C}$
$T_{JM}$		150 $^\circ\text{C}$
$T_{stg}$		$-55 \dots +150$ $^\circ\text{C}$
	Maximum Lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s	300 $^\circ\text{C}$
	Maximum Tab temperature for soldering SMD devices for 10 s	260 $^\circ\text{C}$
$M_d$	Mounting torque (M3) (TO-247)	1.13/10Nm/lb.in.
<b>Weight</b>	TO-247 AD	6 g
	TO-268	4 g

### TO-268 (IXBT)



### TO-247 AD (IXBH)



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

### Features

- High Blocking Voltage
- JEDEC TO-268 surface and JEDEC TO-247 AD
- Low conduction losses
- High current handling capability
- MOS Gate turn-on - drive simplicity
- Molding epoxies meet UL 94 V-0 flammability classification

### Applications

- AC motor speed control
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- Capacitor discharge circuits

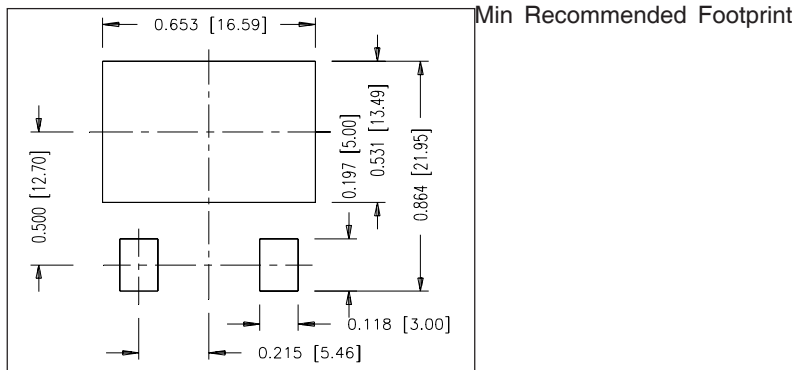
### Advantages

- High power density
- Suitable for surface mounting
- Easy to mount with 1 screw, (isolated mounting screw hole)

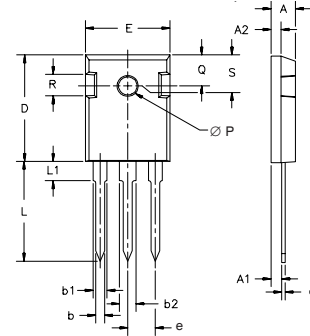
Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$BV_{CES}$	$I_C = 250 \mu\text{A}$ , $V_{GE} = 0 \text{ V}$ Temperature Coefficient	1700	0.10	V %/K
$V_{GE(th)}$	$I_C = 250 \mu\text{A}$ , $V_{CE} = V_{GE}$ Temperature Coefficient	3.0	- 0.24	5.0 V %/K
$I_{CES}$	$V_{CE} = 0.8 V_{CES}$ , $T_J = 25^\circ\text{C}$ $V_{GE} = 0 \text{ V}$ , $T_J = 125^\circ\text{C}$			10 $\mu\text{A}$ 100 $\mu\text{A}$
$I_{GES}$	$V_{CE} = 0 \text{ V}$ , $V_{GE} = \pm 20 \text{ V}$			$\pm 100$ nA
$V_{CE(sat)}$	$I_C = I_{C90}$ , $V_{GE} = 15 \text{ V}$ $T_J = 125^\circ\text{C}$	3.4	4.1	3.8 V V

Symbol	Test Conditions	Characteristic Values		
		(T <sub>J</sub> = 25°C, unless otherwise specified)		
		min.	typ.	max.
<b>g<sub>fs</sub></b>	I <sub>C</sub> = I <sub>C90</sub> ; V <sub>CE</sub> = 10 V, Pulse test, t ≤ 300 μs, duty cycle ≤ 2 %	4.0	6.5	S
<b>C<sub>ies</sub></b>	V <sub>CE</sub> = 25 V, V <sub>GE</sub> = 0 V, f = 1 MHz		700	pF
<b>C<sub>oes</sub></b>			40	pF
<b>C<sub>res</sub></b>			12	pF
<b>Q<sub>g</sub></b>	I <sub>C</sub> = I <sub>C90</sub> ; V <sub>GE</sub> = 15 V, V <sub>CE</sub> = 0.5 V <sub>CES</sub>		30	nC
<b>Q<sub>ge</sub></b>			6	nC
<b>Q<sub>gc</sub></b>			10	nC
<b>t<sub>d(on)</sub></b>	<b>Inductive load, T<sub>J</sub> = 25°C</b> I <sub>C</sub> = I <sub>C90</sub> ; V <sub>GE</sub> = 15 V V <sub>CE</sub> = 0.8 V <sub>CES</sub> ; R <sub>G</sub> = R <sub>off</sub> = 56 Ω		35	ns
<b>t<sub>ri</sub></b>			28	ns
<b>t<sub>d(off)</sub></b>			500	ns
<b>t<sub>fi</sub></b>			1000	ns
<b>E<sub>off</sub></b>			6	mJ
<b>t<sub>d(on)</sub></b>	<b>Inductive load, T<sub>J</sub> = 125°C</b> I <sub>C</sub> = I <sub>C90</sub> ; V <sub>GE</sub> = 15 V V <sub>CE</sub> = 0.8 V <sub>CES</sub> ; R <sub>G</sub> = R <sub>off</sub> = 56 Ω		35	ns
<b>t<sub>ri</sub></b>			28	ns
<b>E<sub>on</sub></b>			0.7	mJ
<b>t<sub>d(off)</sub></b>			600	ns
<b>t<sub>fi</sub></b>			1200	ns
<b>E<sub>off</sub></b>		8	mJ	
<b>R<sub>thJC</sub></b>				0.89 K/W
<b>R<sub>thCK</sub></b>	(TO-247)	0.25		K/W

Symbol	Test Conditions	Characteristic Values		
		(T <sub>J</sub> = 25°C, unless otherwise specified)		
		min.	typ.	max.
<b>V<sub>F</sub></b>	I <sub>F</sub> = I <sub>C90</sub> ; V <sub>GE</sub> = 0 V, Pulse test, t ≤ 300 μs, duty cycle d ≤ 2%			3.0 V
<b>I<sub>RM</sub></b>	I <sub>F</sub> = I <sub>C90</sub> ; V <sub>GE</sub> = 0 V, -di <sub>F</sub> /dt = 50 A/μs V <sub>R</sub> = 100 V		10	A
<b>t<sub>rr</sub></b>			360	ns

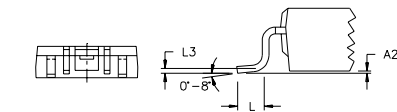
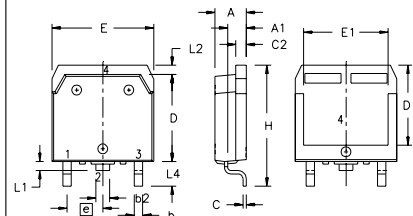


### TO-247 AD Outline



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.7	5.3	.185	.209
A <sub>1</sub>	2.2	2.54	.087	.102
A <sub>2</sub>	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b <sub>1</sub>	1.65	2.13	.065	.084
b <sub>2</sub>	2.87	3.12	.113	.123
C	.4	.8	.016	.031
D	20.80	21.46	.819	.845
E	15.75	16.26	.610	.640
e	5.20	5.72	0.205	0.225
L	19.81	20.32	.780	.800
L <sub>1</sub>		4.50		.177
∅P	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216
S	6.15	BSC	242	BSC

### TO-268 Outline



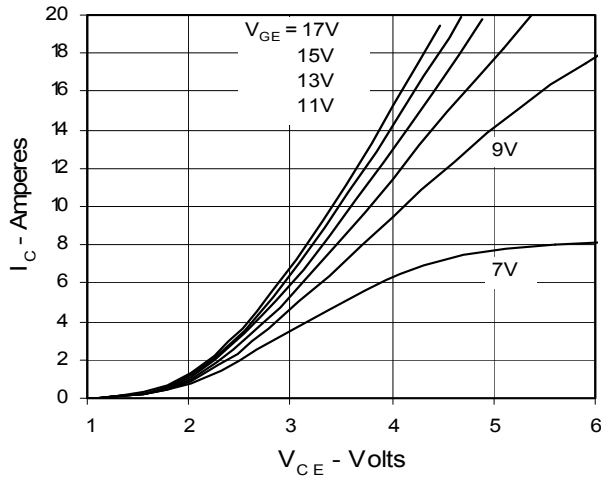
SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.193	.201	4.90	5.10
A <sub>1</sub>	.106	.114	2.70	2.90
A <sub>2</sub>	.001	.010	0.02	0.25
b	.045	.057	1.15	1.45
b <sub>2</sub>	.075	.083	1.90	2.10
C	.016	.026	0.40	0.65
C <sub>2</sub>	.057	.063	1.45	1.60
D	.543	.551	13.80	14.00
D <sub>1</sub>	.488	.500	12.40	12.70
E	.624	.632	15.85	16.05
E <sub>1</sub>	.524	.535	13.30	13.60
e	.215	BSC	5.45	BSC
H	.736	.752	18.70	19.10
L	.094	.106	2.40	2.70
L <sub>1</sub>	.047	.055	1.20	1.40
L <sub>2</sub>	.039	.045	1.00	1.15
L <sub>3</sub>	.010	BSC	0.25	BSC
L <sub>4</sub>	.150	.161	3.80	4.10

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

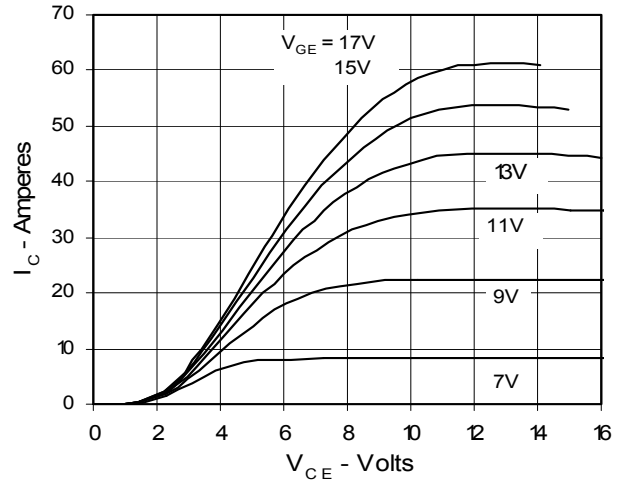
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

4,835,592 4,881,106 5,017,508 5,049,961 5,187,117 5,486,715 6,306,728B1 6,259,123B1 6,306,728B1  
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

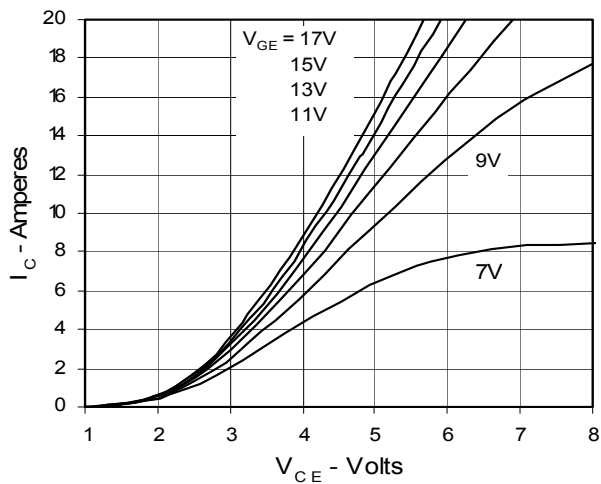
**Fig. 1. Output Characteristics**  
@ 25 Deg. C



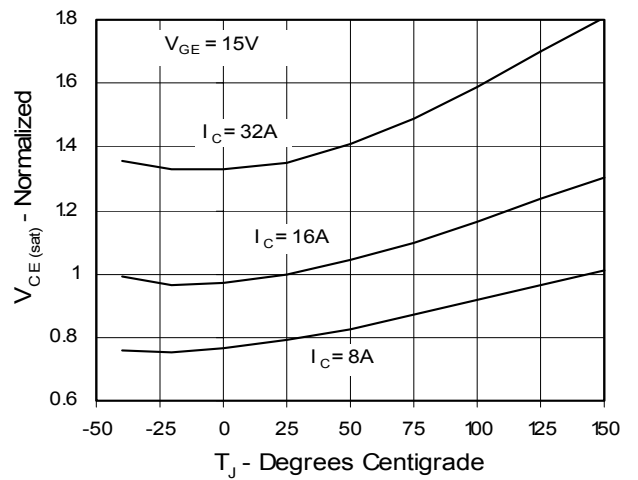
**Fig. 2. Extended Output Characteristics**  
@ 25 deg. C



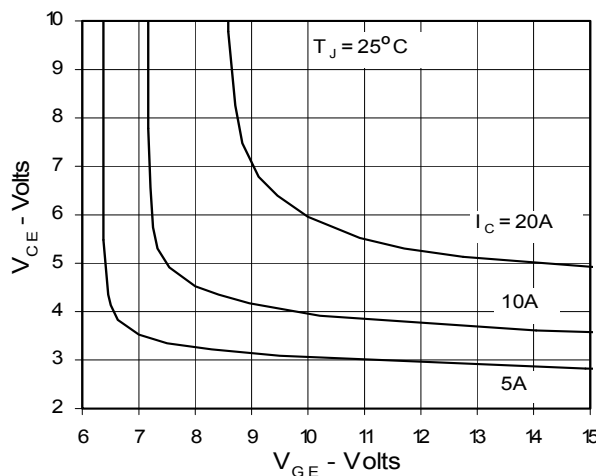
**Fig. 3. Output Characteristics**  
@ 125 Deg. C



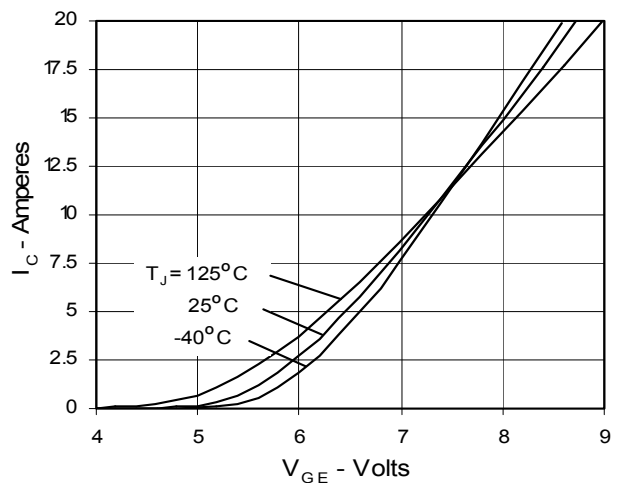
**Fig. 4. Temperature Dependence of  $V_{CE(sat)}$**



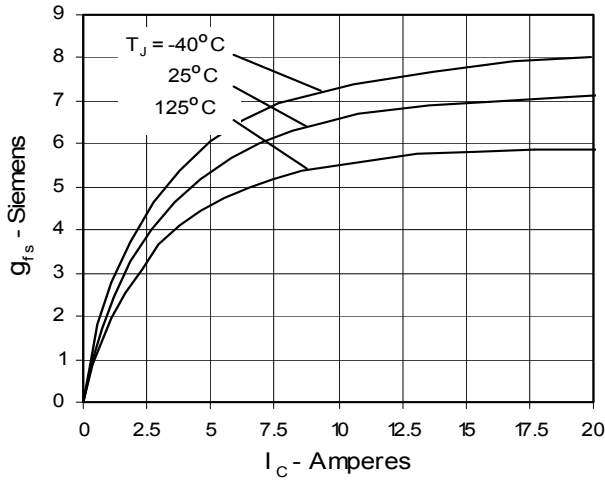
**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter voltage**



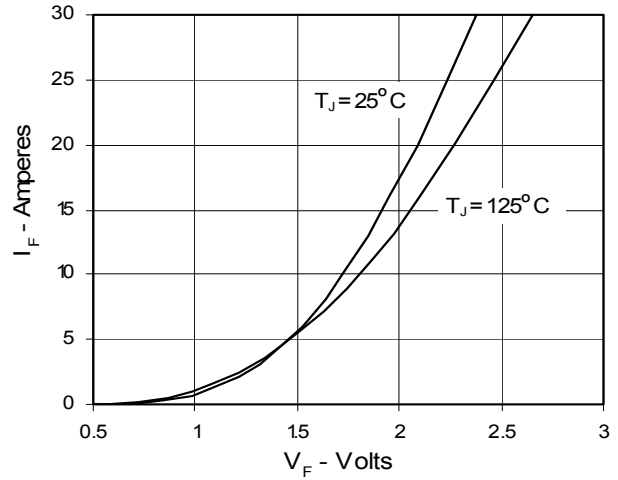
**Fig. 6. Input Admittance**



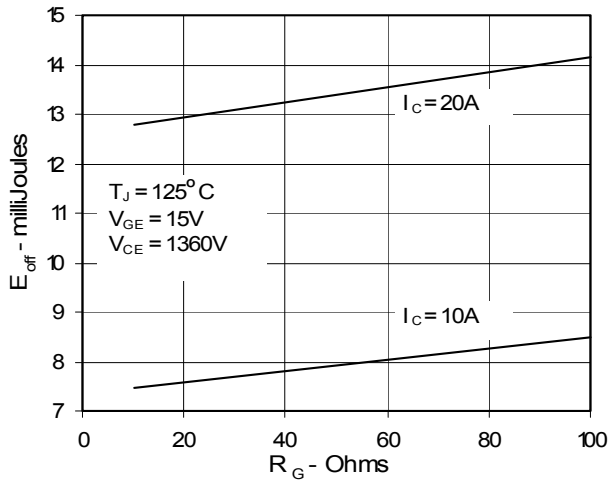
**Fig. 7. Transconductance**



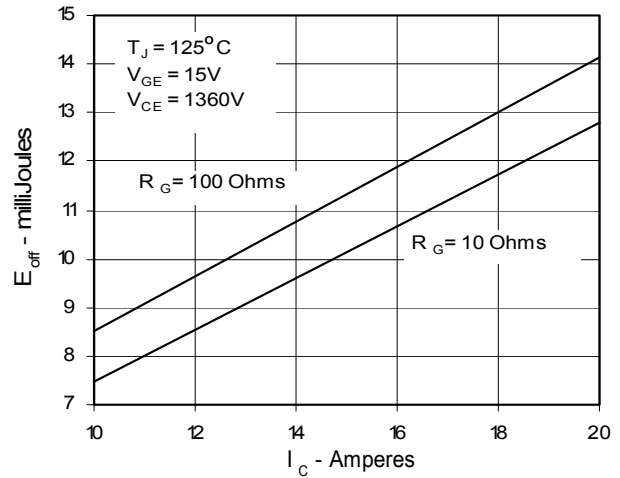
**Fig. 8. Forward Voltage Drop of Intrinsic Diode**



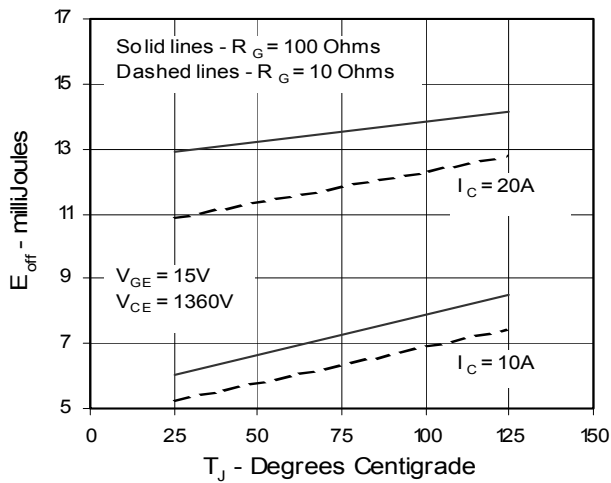
**Fig. 9. Dependence of  $E_{off}$  on  $R_G$**



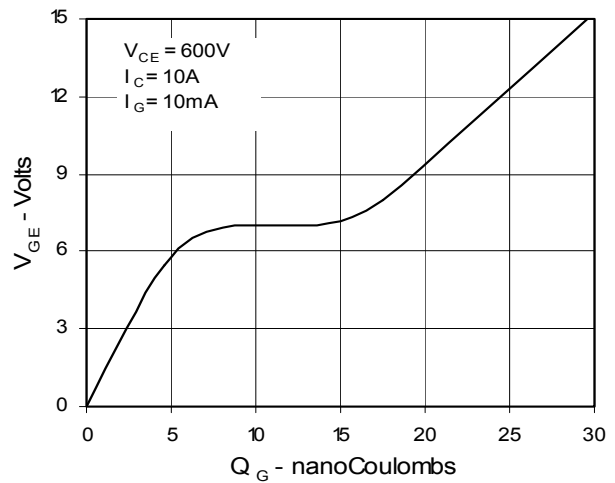
**Fig. 10. Dependence of  $E_{off}$  on  $I_C$**



**Fig. 11. Dependence of  $E_{off}$  on Temperature**



**Fig. 12. Gate Charge**



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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

Fig. 12. Capacitance

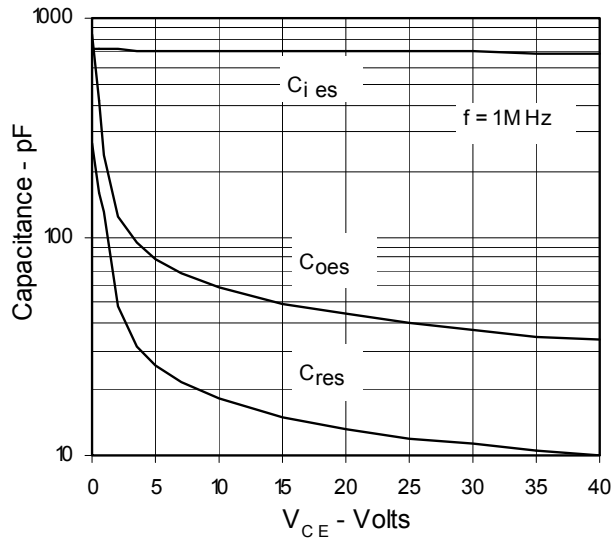
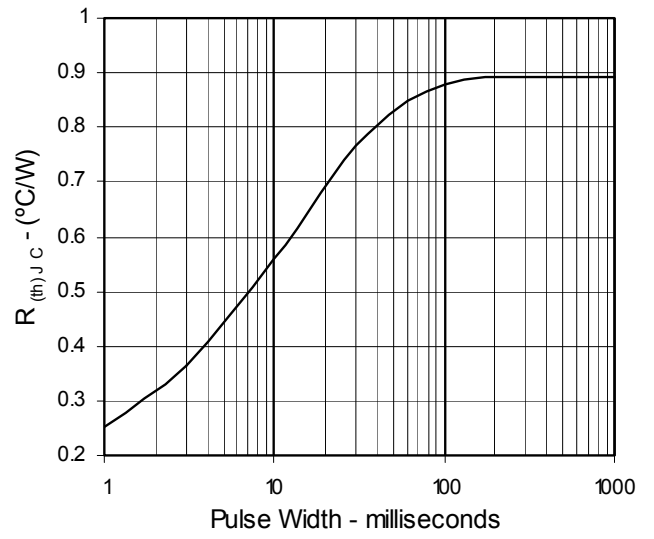


Fig. 13. Maximum Transient Thermal Resistance





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