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With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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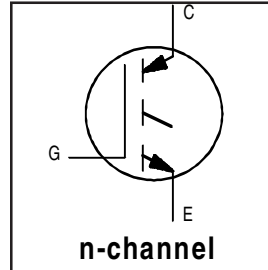


IRG4BC40K

Short Circuit Rated
UltraFast IGBT

Features

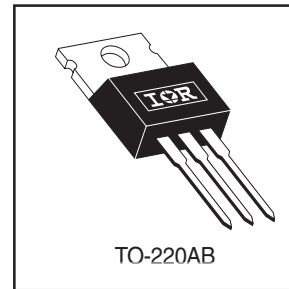
- Short Circuit Rated UltraFast: optimized for high operating frequencies >5.0 kHz , and Short Circuit Rated to 10 μ s @ 125°C, V_{GE} = 15V
- Generation 4 IGBT design provides higher efficiency than Generation 3
- Industry standard TO-247AC package



V _{CES} = 600V
V _{CE(on)} typ. = 2.1V
@ V _{GE} = 15V, I _C = 25A

Benefits

- Generation 4 IGBTs offer highest efficiency available
- IGBTs optimized for specified application conditions



Absolute Maximum Ratings

	Parameter	Max.	Units
V _{CES}	Collector-to-Emitter Voltage	600	V
I _C @ T _C = 25°C	Continuous Collector Current	42	A
I _C @ T _C = 100°C	Continuous Collector Current	25	
I _{CM}	Pulsed Collector Current ①	84	
I _{LM}	Clamped Inductive Load Current ②	84	
t _{sc}	Short Circuit Withstand Time	10	μ s
V _{GE}	Gate-to-Emitter Voltage	\pm 20	V
E _{ARV}	Reverse Voltage Avalanche Energy ③	15	mJ
P _D @ T _C = 25°C	Maximum Power Dissipation	160	W
P _D @ T _C = 100°C	Maximum Power Dissipation	65	
T _J	Operating Junction and	-55 to +150	°C
T _{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 sec.		
	Mounting torque, 6-32 or M3 screw.	10 lbf•in (1.1N•m)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
R _{θJC}	Junction-to-Case	—	0.77	°C/W
R _{θCS}	Case-to-Sink, Flat, Greased Surface	0.50	—	
R _{θJA}	Junction-to-Ambient, typical socket mount	—	80	
Wt	Weight	2 (0.07)	—	g (oz)

Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)CES}$	Collector-to-Emitter Breakdown Voltage	600	—	—	V	$V_{GE} = 0V, I_C = 250\mu A$
$V_{(BR)ECS}$	Emitter-to-Collector Breakdown Voltage ④	18	—	—	V	$V_{GE} = 0V, I_C = 1.0A$
$\Delta V_{(BR)CES}/\Delta T_J$	Temperature Coeff. of Breakdown Voltage	—	0.46	—	V/°C	$V_{GE} = 0V, I_C = 1.0mA$
$V_{CE(ON)}$	Collector-to-Emitter Saturation Voltage	—	2.10	2.6	V	$I_C = 25A$ $I_C = 42A$ $I_C = 25A, T_J = 150^\circ\text{C}$ $V_{GE} = 15V$ See Fig.2, 5
		—	2.70	—		
		—	2.14	—		
$V_{GE(th)}$	Gate Threshold Voltage	3.0	—	6.0		$V_{CE} = V_{GE}, I_C = 250\mu A$
$\Delta V_{GE(th)}/\Delta T_J$	Temperature Coeff. of Threshold Voltage	—	-13	—	mV/°C	$V_{CE} = V_{GE}, I_C = 250\mu A$
g_{fe}	Forward Transconductance ⑤	7.0	14	—	S	$V_{CE} = 100V, I_C = 25A$
I_{CES}	Zero Gate Voltage Collector Current	—	—	250	μA	$V_{GE} = 0V, V_{CE} = 600V$
		—	—	2.0		$V_{GE} = 0V, V_{CE} = 10V, T_J = 25^\circ\text{C}$
		—	—	2000		$V_{GE} = 0V, V_{CE} = 600V, T_J = 150^\circ\text{C}$
I_{GES}	Gate-to-Emitter Leakage Current	—	—	± 100	nA	$V_{GE} = \pm 20V$

Switching Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
Q_g	Total Gate Charge (turn-on)	—	120	180	nC	$I_C = 25A$ $V_{CC} = 400V$ $V_{GE} = 15V$ See Fig.8
Q_{ge}	Gate - Emitter Charge (turn-on)	—	16	24		
Q_{gc}	Gate - Collector Charge (turn-on)	—	51	77		
$t_{d(on)}$	Turn-On Delay Time	—	30	—	ns	$T_J = 25^\circ\text{C}$ $I_C = 25A, V_{CC} = 480V$ $V_{GE} = 15V, R_G = 10\Omega$ Energy losses include "tail" See Fig. 9,10,14
t_r	Rise Time	—	15	—		
$t_{d(off)}$	Turn-Off Delay Time	—	140	210		
t_f	Fall Time	—	140	210		
E_{on}	Turn-On Switching Loss	—	0.62	—	mJ	See Fig. 9,10,14
E_{off}	Turn-Off Switching Loss	—	0.33	—		
E_{ts}	Total Switching Loss	—	0.95	1.4		
t_{sc}	Short Circuit Withstand Time	10	—	—	μs	$V_{CC} = 400V, T_J = 125^\circ\text{C}$ $V_{GE} = 15V, R_G = 10\Omega, V_{CPK} < 500V$
$t_{d(on)}$	Turn-On Delay Time	—	30	—	ns	$T_J = 150^\circ\text{C}$ $I_C = 25A, V_{CC} = 480V$ $V_{GE} = 15V, R_G = 10\Omega$ Energy losses include "tail" See Fig. 11,14
t_r	Rise Time	—	18	—		
$t_{d(off)}$	Turn-Off Delay Time	—	190	—		
t_f	Fall Time	—	150	—		
E_{ts}	Total Switching Loss	—	1.9	—	mJ	
L_E	Internal Emitter Inductance	—	13	—	nH	Measured 5mm from package
C_{ies}	Input Capacitance	—	1600	—	pF	$V_{GE} = 0V$ $V_{CC} = 30V$ $f = 1.0MHz$ See Fig. 7
C_{oes}	Output Capacitance	—	130	—		
C_{res}	Reverse Transfer Capacitance	—	55	—		

Notes:

- | | |
|--|---|
| ① Repetitive rating; $V_{GE} = 20V$, pulse width limited by max. junction temperature. (See fig. 13b) | ③ Repetitive rating; pulse width limited by maximum junction temperature. |
| ② $V_{CC} = 80\%(V_{CES})$, $V_{GE} = 20V$, $L = 10\mu H$, $R_G = 10\Omega$, (See fig. 13a) | ④ Pulse width $\leq 80\mu s$; duty factor $\leq 0.1\%$. |
| | ⑤ Pulse width $5.0\mu s$, single shot. |

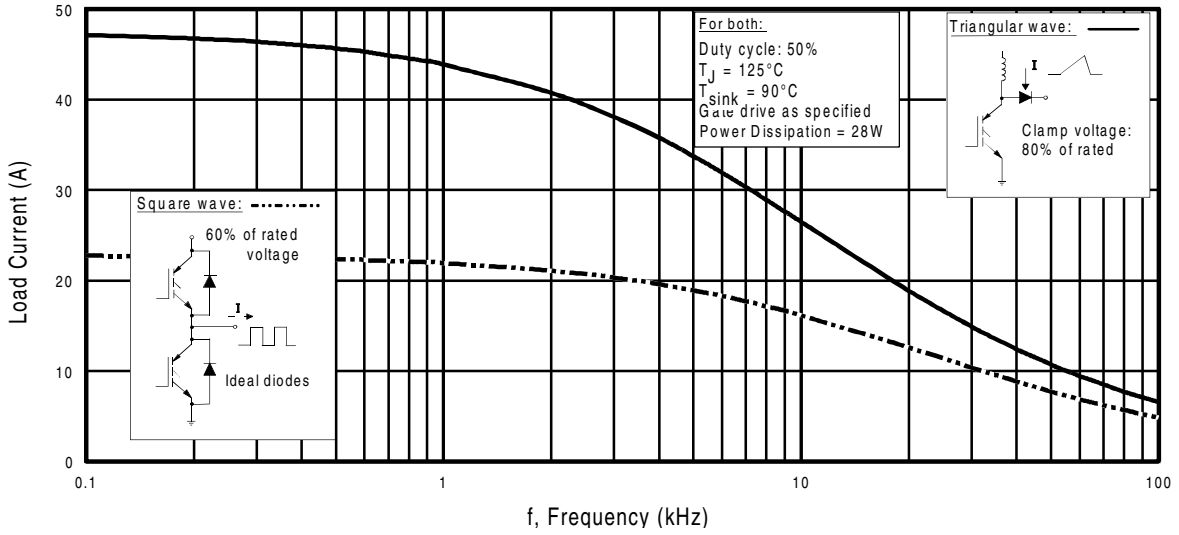


Fig. 1 - Typical Load Current vs. Frequency
(Load Current = I_{RMS} of fundamental)

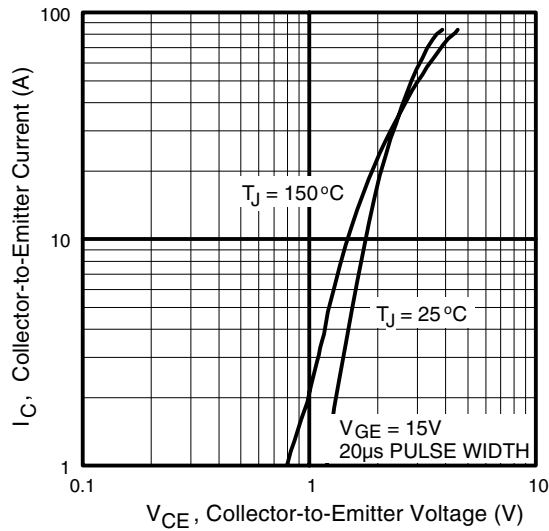


Fig. 2 - Typical Output Characteristics

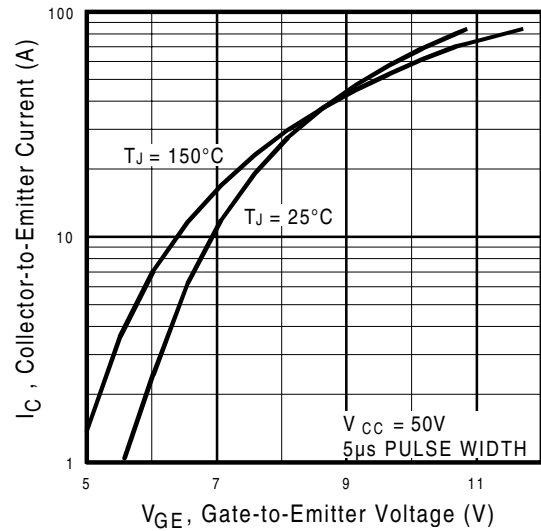


Fig. 3 - Typical Transfer Characteristics

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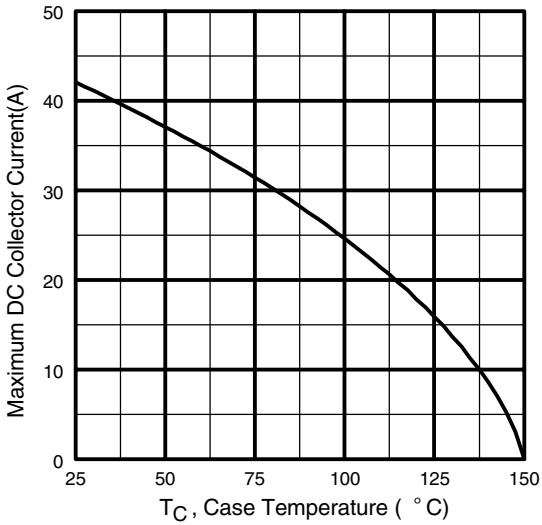


Fig. 4 - Maximum Collector Current vs. Case Temperature

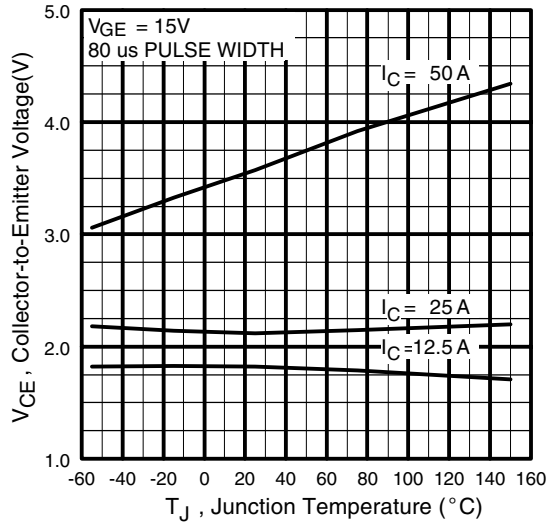


Fig. 5 - Typical Collector-to-Emitter Voltage vs. Junction Temperature

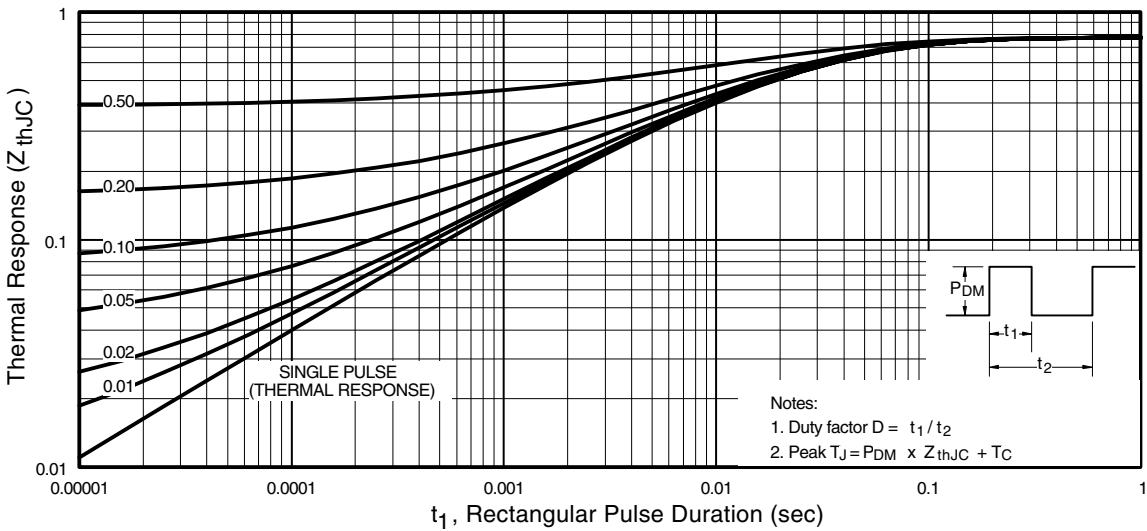


Fig. 6 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

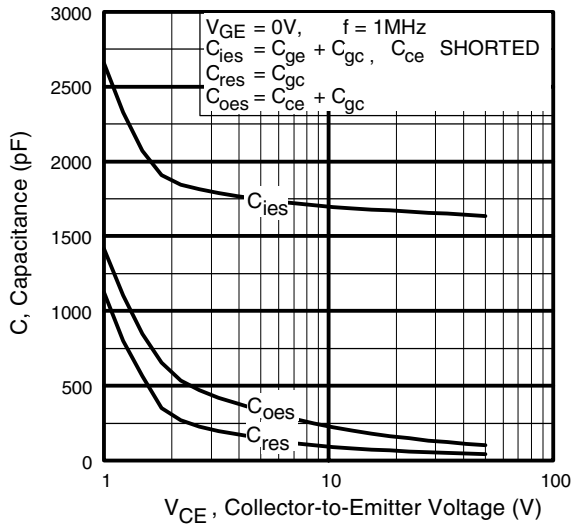


Fig. 7 - Typical Capacitance vs. Collector-to-Emitter Voltage

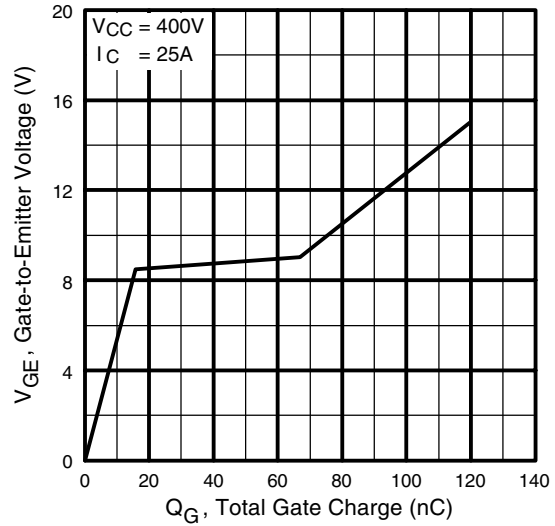


Fig. 8 - Typical Gate Charge vs. Gate-to-Emitter Voltage

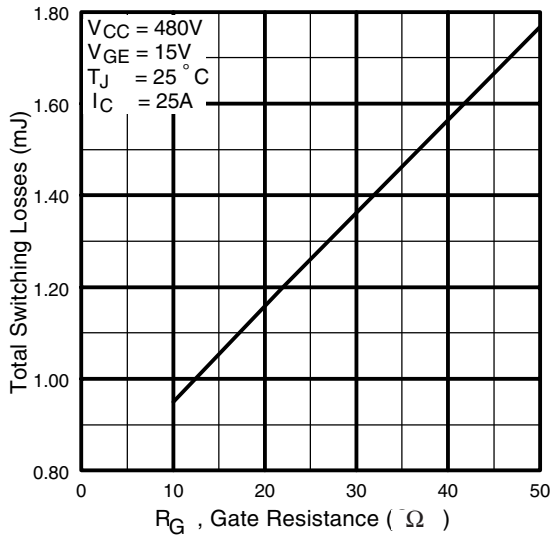


Fig. 9 - Typical Switching Losses vs. Gate Resistance

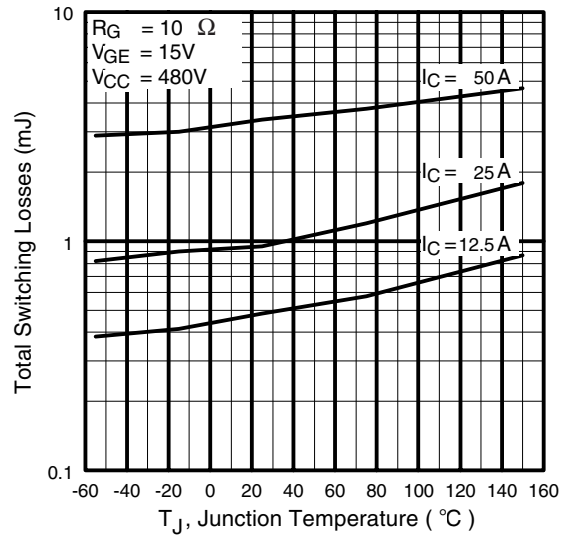


Fig. 10 - Typical Switching Losses vs. Junction Temperature

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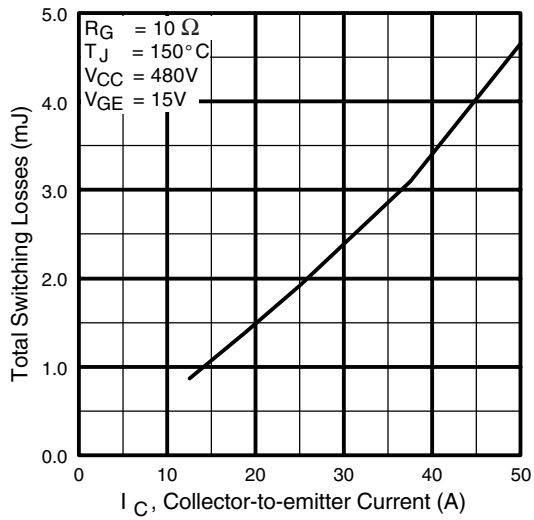


Fig. 11 - Typical Switching Losses vs. Collector-to-Emitter Current

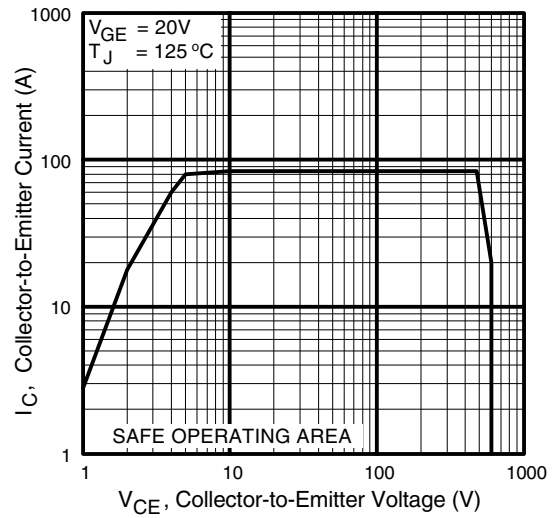
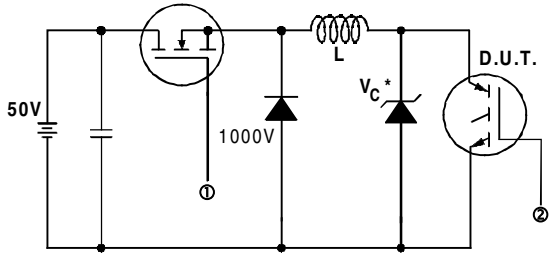


Fig. 12 - Turn-Off SOA



* Driver same type as D.U.T.; $V_c = 80\%$ of $V_{ce(max)}$
 * Note: Due to the 50V power supply, pulse width and inductor will increase to obtain rated I_d .

Fig. 13a - Clamped Inductive Load Test Circuit

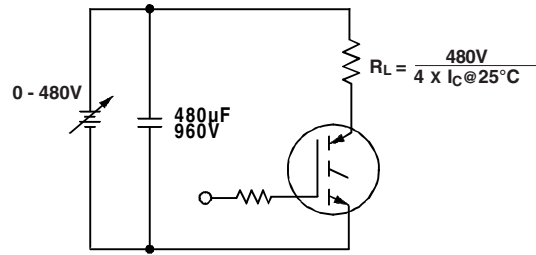


Fig. 13b - Pulsed Collector Current Test Circuit

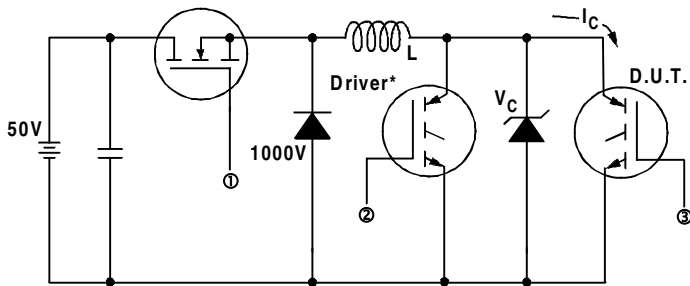


Fig. 14a - Switching Loss Test Circuit

* Driver same type as D.U.T., $V_C = 480V$

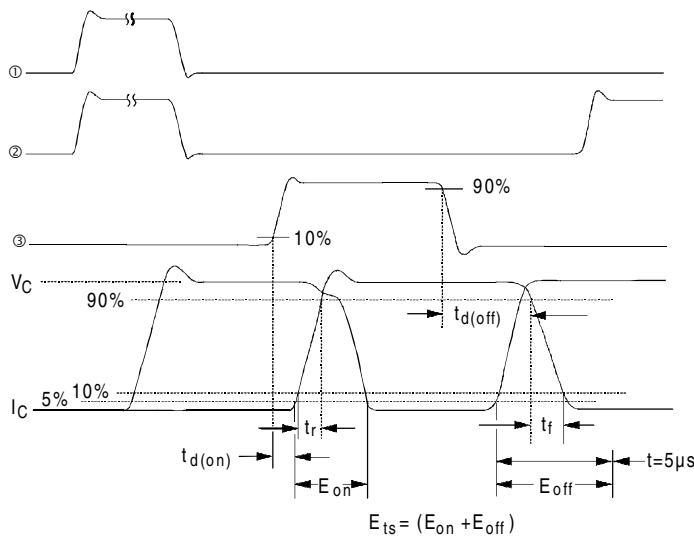
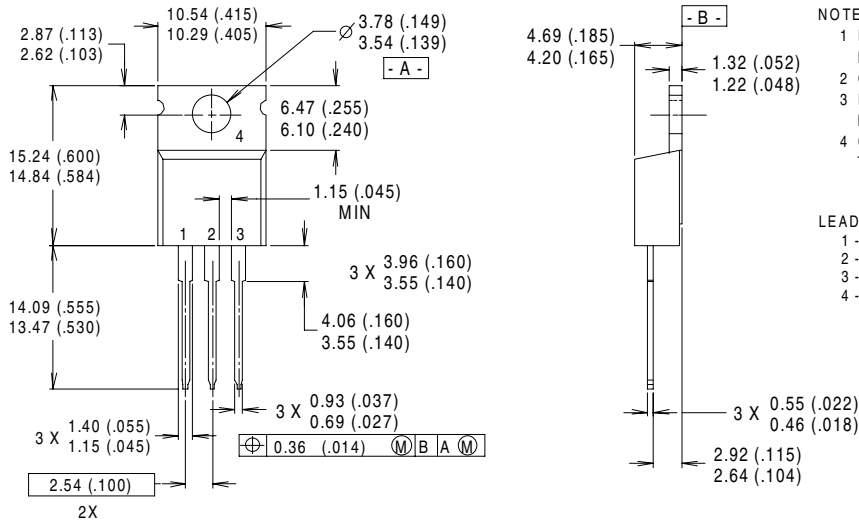


Fig. 14b - Switching Loss Waveforms

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Case Outline and Dimensions — TO-220AB



CONFORMS TO JEDEC OUTLINE TO-220AB
Dimensions in Millimeters and (Inches)

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IR Rectifier

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Data and specifications subject to change without notice. 4/00

Note: For the most current drawings please refer to the IR website at:
<http://www.irf.com/package/>