

IRG4IBC20WPbF

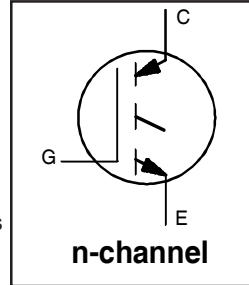
INSULATED GATE BIPOLAR TRANSISTOR

Features

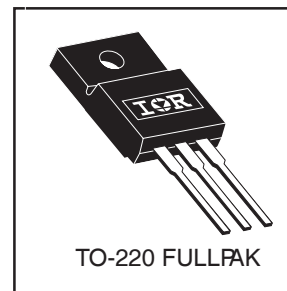
- Designed expressly for Switch-Mode Power Supply and PFC (power factor correction) applications
- 2.5kV, 60s insulation voltage ©
- Industry-benchmark switching losses improve efficiency of all power supply topologies
- 50% reduction of Eoff parameter
- Low IGBT conduction losses
- Latest-generation IGBT design and construction offers tighter parameters distribution, exceptional reliability
- Industry standard Isolated TO-220 Fullpak™ outline
- Lead-Free

Benefits

- Lower switching losses allow more cost-effective operation than power MOSFETs up to 150 kHz ("hard switched" mode)
- Of particular benefit to single-ended converters and boost PFC topologies 150W and higher
- Low conduction losses and minimal minority-carrier recombination make these an excellent option for resonant mode switching as well (up to >>300 kHz)



$V_{CES} = 600V$
$V_{CE(on) typ.} = 2.16V$
@ $V_{GE} = 15V, I_C = 6.5A$



Absolute Maximum Ratings

	Parameter	Max.	Units
V_{CES}	Collector-to-Emitter Breakdown Voltage	600	V
$I_C @ T_C = 25^\circ C$	Continuous Collector Current	12	A
$I_C @ T_C = 100^\circ C$	Continuous Collector Current	6.0	
I_{CM}	Pulsed Collector Current ①	52	
I_{LM}	Clamped Inductive Load Current ②	52	
V_{GE}	Gate-to-Emitter Voltage	± 20	V
E_{ARV}	Reverse Voltage Avalanche Energy ③	200	mJ
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	34	W
$P_D @ T_C = 100^\circ C$	Maximum Power Dissipation	14	
T_J	Operating Junction and	-55 to + 150	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds	300 (0.063 in. (1.6mm) from case)	
	Mounting torque, 6-32 or M3 screw.	10 lbf•in (1.1N•m)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case - IGBT	—	3.7	°C/W
$R_{\theta JA}$	Junction-to-Ambient, typical socket mount	—	65	
Wt	Weight	2.0 (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	$V_{GE} = 0V, I_C = 250\mu\text{A}$
$V_{(BR)ECS}$	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	—	0.48	—	$V/^\circ\text{C}$	$V_{GE} = 0V, I_C = 1.0mA$
$V_{CE(ON)}$	Collector-to-Emitter Saturation Voltage	—	2.16	2.6	V	$I_C = 6.5A$ $I_C = 13A$ $I_C = 6.5A, T_J = 150^\circ\text{C}$ $V_{GE} = 15V$ See Fig.2, 5
		—	2.55	—		
		—	2.05	—		
$V_{GE(th)}$	Gate Threshold Voltage	3.0	—	6.0		$V_{CE} = V_{GE}, I_C = 250\mu\text{A}$
$\Delta V_{GE(th)}/\Delta T_J$	Temperature Coeff. of Threshold Voltage	—	-8.8	—	$\text{mV}/^\circ\text{C}$	$V_{CE} = V_{GE}, I_C = 250\mu\text{A}$
g_{fe}	Forward Transconductance ⑤	5.5	8.3	—	S	$V_{CE} = 100V, I_C = 6.5A$
I_{CES}	Zero Gate Voltage Collector Current	—	—	250	μA	$V_{GE} = 0V, V_{CE} = 600V$
		—	—	2.0		$V_{GE} = 0V, V_{CE} = 10V, T_J = 25^\circ\text{C}$
		—	—	1000		$V_{GE} = 0V, V_{CE} = 600V, T_J = 150^\circ\text{C}$
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)	—	26	38	nC	$I_C = 6.5A$ $V_{CC} = 400V$ $V_{GE} = 15V$ See Fig.8
Q_{ge}	Gate - Emitter Charge (turn-on)	—	3.7	5.5		
Q_{gc}	Gate - Collector Charge (turn-on)	—	10	15		
$t_{d(on)}$	Turn-On Delay Time	—	22	—	ns	$T_J = 25^\circ\text{C}$ $I_C = 6.5A, V_{CC} = 480V$ $V_{GE} = 15V, R_G = 50\Omega$ Energy losses include "tail" See Fig. 9, 10, 14
t_r	Rise Time	—	14	—		
$t_{d(off)}$	Turn-Off Delay Time	—	110	160		
t_f	Fall Time	—	64	96		
E_{on}	Turn-On Switching Loss	—	0.06	—	mJ	See Fig. 9, 10, 14
E_{off}	Turn-Off Switching Loss	—	0.08	—		
E_{ts}	Total Switching Loss	—	0.14	0.2	ns	$T_J = 150^\circ\text{C},$ $I_C = 6.5A, V_{CC} = 480V$ $V_{GE} = 15V, R_G = 50\Omega$ Energy losses include "tail" See Fig. 10, 11, 14
$t_{d(on)}$	Turn-On Delay Time	—	21	—		
t_r	Rise Time	—	15	—		
$t_{d(off)}$	Turn-Off Delay Time	—	150	—		
t_f	Fall Time	—	150	—	mJ	See Fig. 10, 11, 14
E_{ts}	Total Switching Loss	—	0.34	—		
L_E	Internal Emitter Inductance	—	7.5	—	nH	Measured 5mm from package
C_{ies}	Input Capacitance	—	490	—	pF	$V_{GE} = 0V$ $V_{CC} = 30V$ $f = 1.0\text{MHz}$ See Fig. 7
C_{oes}	Output Capacitance	—	38	—		
C_{res}	Reverse Transfer Capacitance	—	8.8	—		

Notes:

- ① Repetitive rating; $V_{GE} = 20V$, pulse width limited by max. junction temperature. (See fig. 13b)
- ② $V_{CC} = 80\%(V_{CES}), V_{GE} = 20V, L = 10\mu\text{H}, R_G = 50\Omega,$ (See fig. 13a)
- ③ Repetitive rating; pulse width limited by maximum junction temperature.
- ④ Pulse width $\leq 80\mu\text{s}$; duty factor $\leq 0.1\%$.
- ⑤ Pulse width $5.0\mu\text{s}$, single shot.
- ⑥ $t = 60\text{s}, f = 60\text{Hz}$

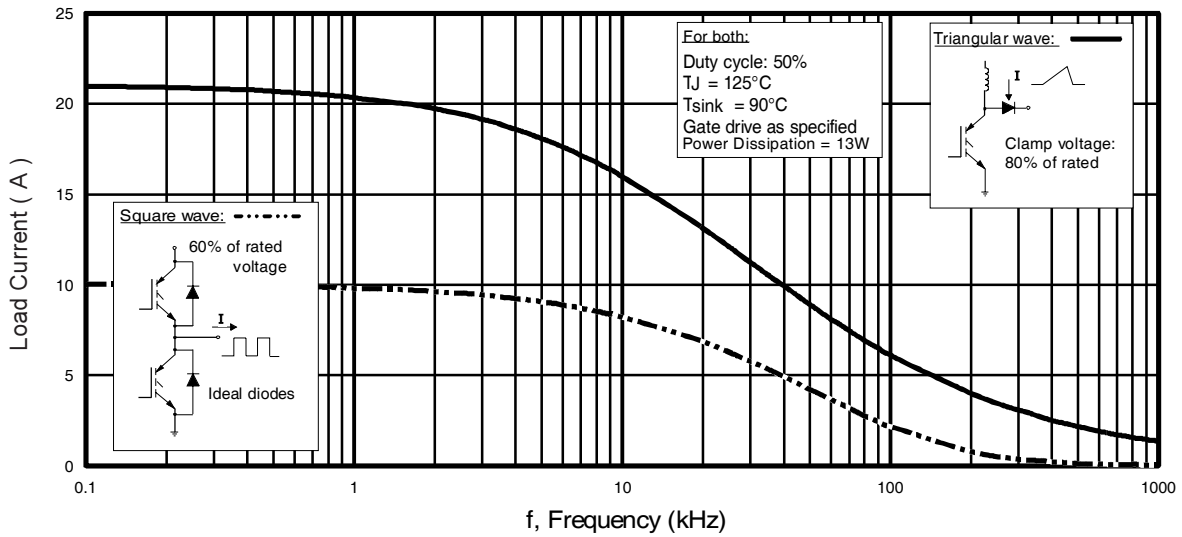


Fig. 1 - Typical Load Current vs. Frequency
(Load Current = I_{RMS} of fundamental)

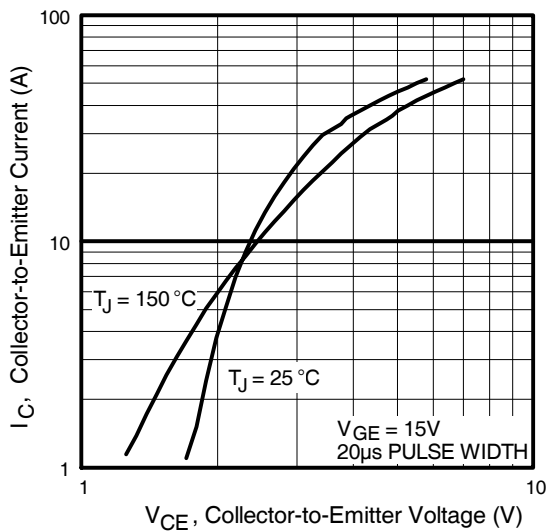


Fig. 2 - Typical Output Characteristics

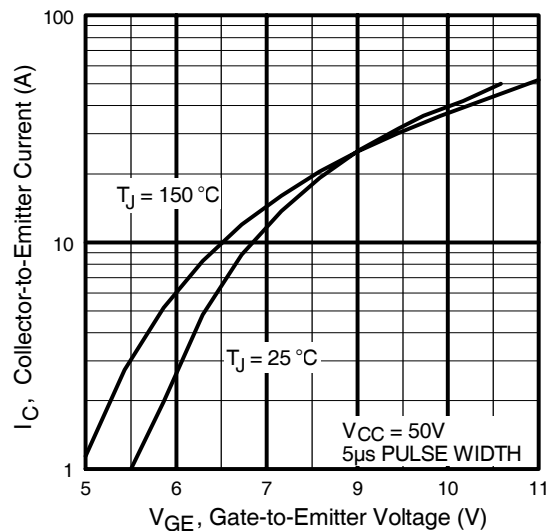


Fig. 3 - Typical Transfer Characteristics

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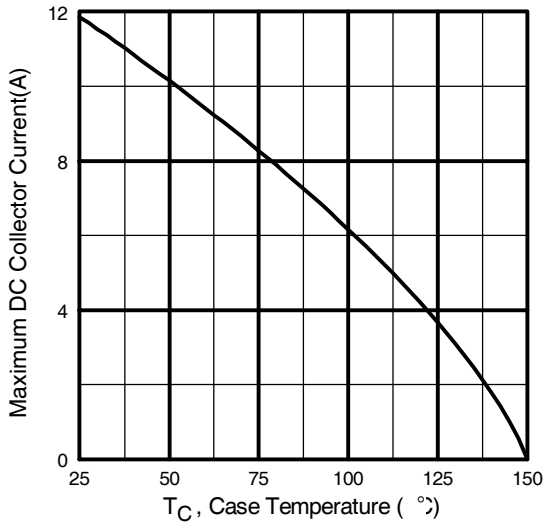


Fig. 4 - Maximum Collector Current vs. Case Temperature

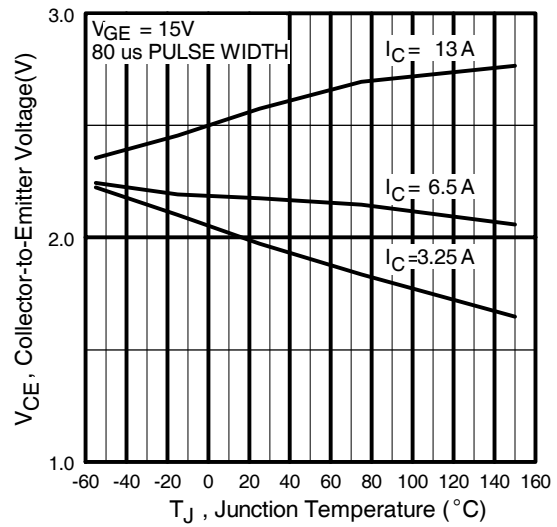


Fig. 5 - Typical Collector-to-Emitter Voltage vs. Junction Temperature

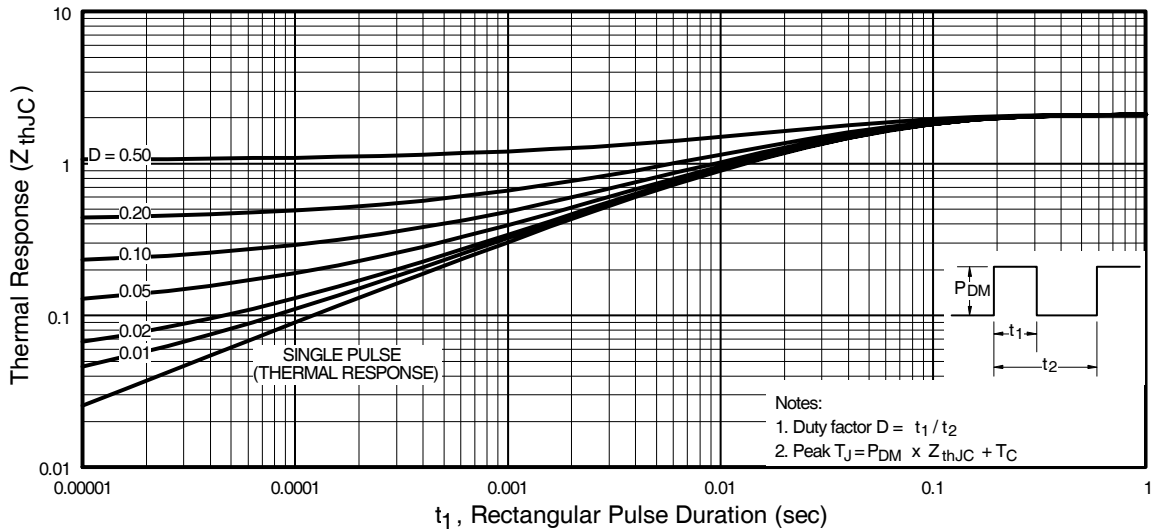


Fig. 6 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

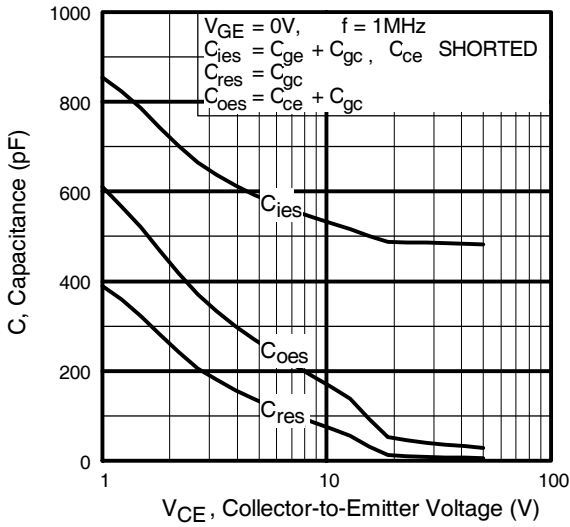


Fig. 7 - Typical Capacitance vs. Collector-to-Emitter Voltage

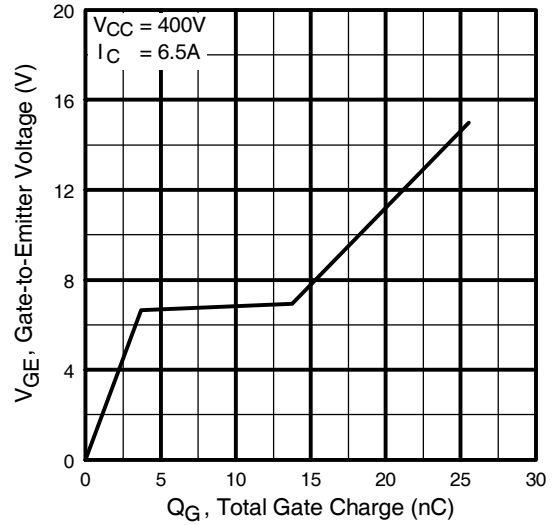


Fig. 8 - Typical Gate Charge vs. Gate-to-Emitter Voltage

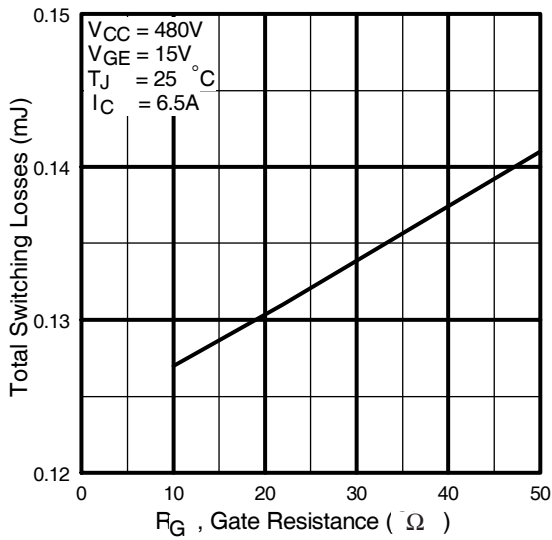


Fig. 9 - Typical Switching Losses vs. Gate Resistance

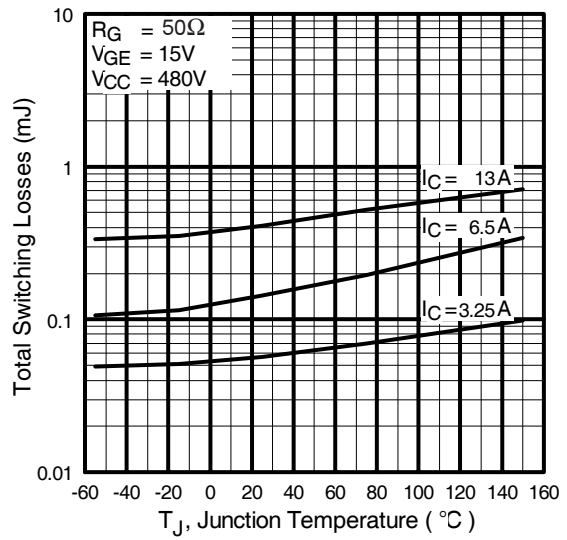


Fig. 10 - Typical Switching Losses vs. Junction Temperature

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International
IR Rectifier

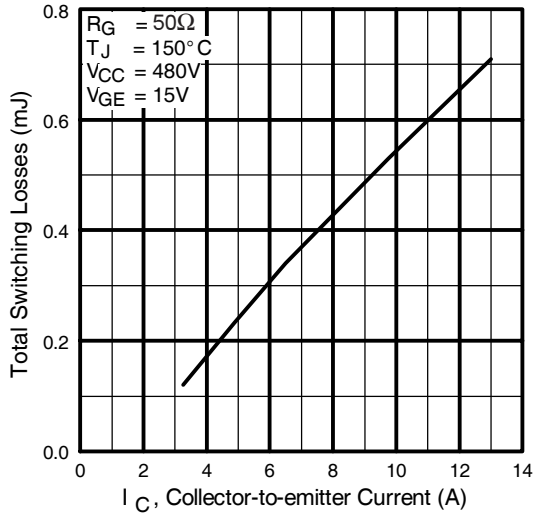


Fig. 11 - Typical Switching Losses vs. Collector-to-Emitter Current

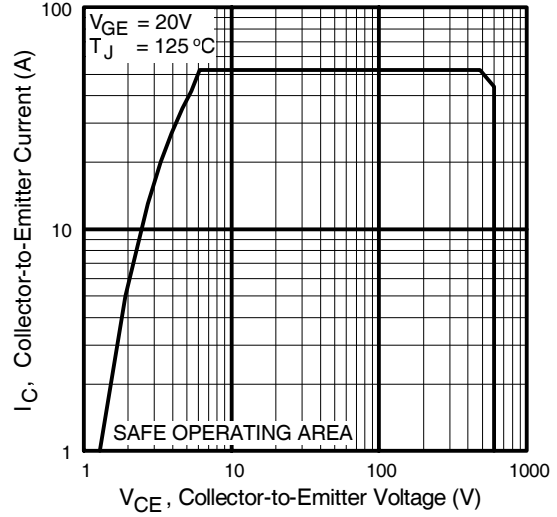
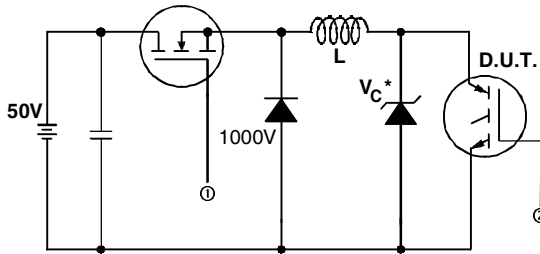


Fig. 12 - Turn-Off SOA



* 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

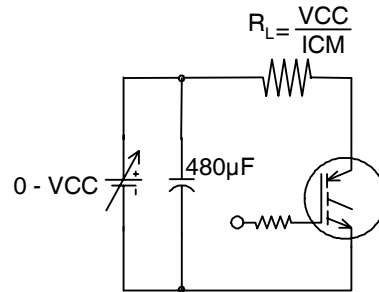


Fig. 13b - Pulsed Collector Current Test Circuit

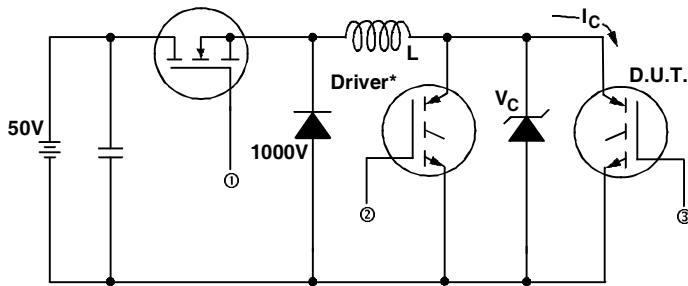


Fig. 14a - Switching Loss Test Circuit

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

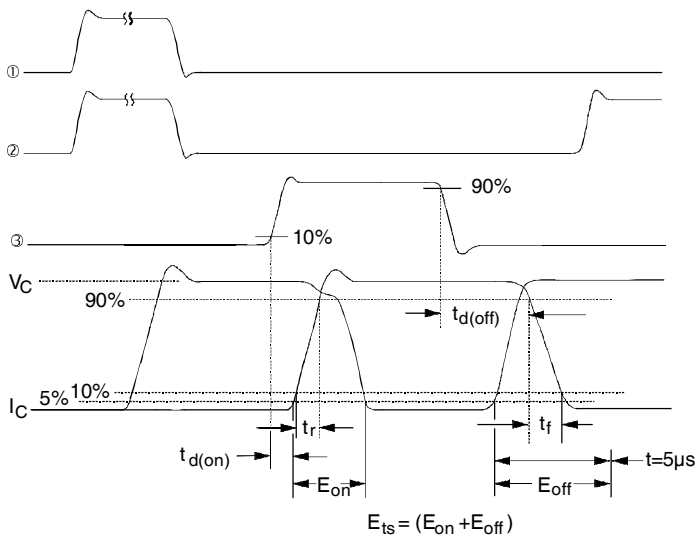
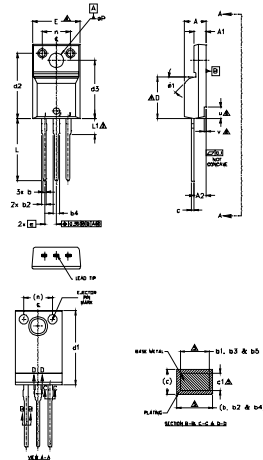


Fig. 14b - Switching Loss Waveforms

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TO-220AB Full-Pak Package Outline

Dimensions are shown in millimeters (inches)



S Y M B O L	DIMENSIONS				N O T E S
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.57	4.83	.180	.190	
A1	2.57	2.85	.101	.111	
A2	2.51	2.93	.099	.115	
b	0.61	0.94	.024	.037	
b1	0.61	0.89	.024	.035	5
b2	0.76	1.27	.030	.050	5
b3	0.76	1.22	.030	.048	5
b4	1.02	1.52	.040	.060	5
b5	1.02	1.47	.040	.058	5
c	0.33	0.65	.013	.026	
c1	0.33	0.58	.013	.023	5
D	8.66	9.80	.341	.386	4
d1	15.80	16.15	.622	.635	
d2	13.97	14.22	.550	.560	
d3	12.30	12.93	.484	.509	
E	9.63	10.76	.379	.423	4
e	2.54	BSC	100	BSC	
L	13.20	13.72	.520	.540	
L1	3.37	3.67	.122	.145	3
n	6.05	6.60	.238	.260	
#P	3.05	3.45	.120	.136	
u	2.40	2.50	.094	.098	6
y	0.40	0.50	.016	.020	6
#Y	-	45°	-	45°	

NOTES:
1. DIMENSIONS AND TOLERANCING AS PER ASME Y14.5 M - 1994.
2. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
3. LEAD DIMENSION AND PITCH UNCONTROLLED IN U.S.
4. DIMENSION D & E DO NOT INCLUDE WELD FLASH. WELD FLASH SHALL NOT EXCEED .200 (0.007) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTER MOST EXTREMES OF THE PLASTIC BODY.
5. DIMENSION AT A, B, B1 & C1 APPLY TO BASE METAL ONLY.
6. STEP OPTIONAL ON PLASTIC BODY DEFINED BY DIMENSIONS 2 & 3 TO CONTROLLING DIMENSION IN NOTES.

LEAD ASSIGNMENTS

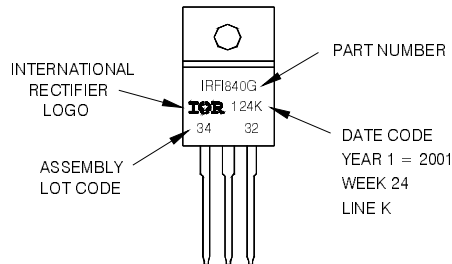
- 1- GATE
- 2- DIODE
- 3- EMITTER

- WELD GRAB**
- 1- GATE
 - 2- COLLECTOR
 - 3- EMITTER

TO-220AB Full-Pak Part Marking Information

EXAMPLE: THIS IS AN IRFI840G
WITH ASSEMBLY
LOT CODE 3432
ASSEMBLED ON WW 24, 2001
IN THE ASSEMBLY LINE 'K'

Note: 'P' in assembly line position
indicates 'Lead-Free'



TO-220AB Full-Pak package is not recommended for Surface Mount Application.

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

Data and specifications subject to change without notice.

单击下面可查看定价，库存，交付和生命周期等信息

[>>Infineon Technologies\(英飞凌\)](#)