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[International Rectifier \(Infineon Technologies Americas Corp.\)
IRG4IBC30SPBF](#)

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sales@integrated-circuit.com

International **IR** Rectifier

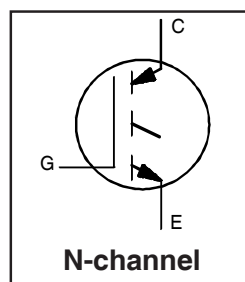
PD - 95637A

IRG4IBC30SPbF

INSULATED GATE BIPOLAR TRANSISTOR

Features

- Standard: Optimized for minimum saturation voltage and low operating frequencies (<1 kHz)
- Generation 4 IGBT design provides tighter parameter distribution and higher efficiency than previous generation
- Industry standard TO-220 Full-Pak
- Lead-Free



$V_{CES} = 600V$
$V_{CE(on)} \text{ typ.} = 1.4V$
@ $V_{GE} = 15V, I_C = 18A$

Benefits

- Generation 4 IGBTs offer highest efficiencies available
- IGBTs optimized for specific application conditions
- Designed to be a "drop-in" replacement for equivalent industry -standard Generation 3 IR IGBTs



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	23.5	A
$I_C @ T_C = 100^\circ C$	Continuous Collector Current	13.0	
I_{CM}	Pulsed Collector Current ①	47	
I_{LM}	Clamped Inductive Load Current ②	47	
V_{GE}	Gate-to-Emitter Voltage	± 20	V
E_{ARV}	Reverse Voltage Avalanche Energy ③	10	mJ
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	45	W
$P_D @ T_C = 100^\circ C$	Maximum Power Dissipation	18	
T_J	Operating Junction and	-55 to + 150	$^\circ C$
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds	300 (0.063 in. (1.6mm) from case)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	2.8	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient, typical socket mount	—	65	
W_t	Weight	2.1 (0.075)	—	g (oz)

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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	—	0.75	—	V/°C	$V_{GE} = 0V, I_C = 1.0mA$
$V_{CE(ON)}$	Collector-to-Emitter Saturation Voltage	—	1.40	1.6	V	$I_C = 18A, V_{GE} = 15V$
		—	1.84	—		$I_C = 34A, V_{GE} = 15V$
		—	1.45	—		$I_C = 18A, T_J = 150^\circ\text{C}$
$V_{GE(th)}$	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	—	-11	—	mV/°C	$V_{CE} = V_{GE}, I_C = 250\mu A$
g_{fe}	Forward Transconductance ⑤	6.0	11	—	S	$V_{CE} = 100V, I_C = 18A$
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)	—	50	75	nC	$I_C = 18A$
Q_{ge}	Gate - Emitter Charge (turn-on)	—	7.3	11		$V_{CC} = 400V$
Q_{gc}	Gate - Collector Charge (turn-on)	—	17	26		$V_{GE} = 15V$
$t_{d(on)}$	Turn-On Delay Time	—	22	—	ns	$T_J = 25^\circ\text{C}$ $I_C = 18A, V_{CC} = 480V$ $V_{GE} = 15V, R_G = 23\Omega$ Energy losses include "tail" See Fig. 9, 10, 14
t_r	Rise Time	—	18	—		
$t_{d(off)}$	Turn-Off Delay Time	—	540	810		
t_f	Fall Time	—	390	590	mJ	$T_J = 150^\circ\text{C}$ $I_C = 18A, V_{CC} = 480V$ $V_{GE} = 15V, R_G = 23\Omega$ Energy losses include "tail" See Fig. 10, 11, 14
E_{on}	Turn-On Switching Loss	—	0.26	—		
E_{off}	Turn-Off Switching Loss	—	3.45	—		
E_{ts}	Total Switching Loss	—	3.71	5.6	nH	Measured 5mm from package
$t_{d(on)}$	Turn-On Delay Time	—	21	—		
t_r	Rise Time	—	19	—		
$t_{d(off)}$	Turn-Off Delay Time	—	790	—	pF	$V_{GE} = 0V$ $V_{CC} = 30V$ $f = 1.0MHz$
t_f	Fall Time	—	760	—		
E_{ts}	Total Switching Loss	—	6.55	—		
L_E	Internal Emitter Inductance	—	7.5	—	pF	See Fig. 7
C_{ies}	Input Capacitance	—	1100	—		
C_{oes}	Output Capacitance	—	72	—		
C_{res}	Reverse Transfer Capacitance	—	19	—		

Notes:

- ① Repetitive rating; $V_{GE} = 20V$, pulse width limited by max. junction temperature. (See Fig. 13b)
- ② $V_{CC} = 80\%(V_{CES})$, $V_{GE} = 20V$, $L = 10\mu H$, $R_G = 23\Omega$, (See Fig. 13a)
- ③ Repetitive rating; pulse width limited by maximum junction temperature.
- ④ Pulse width $\leq 80\mu s$; duty factor $\leq 0.1\%$.
- ⑤ Pulse width $5.0\mu s$, single shot.

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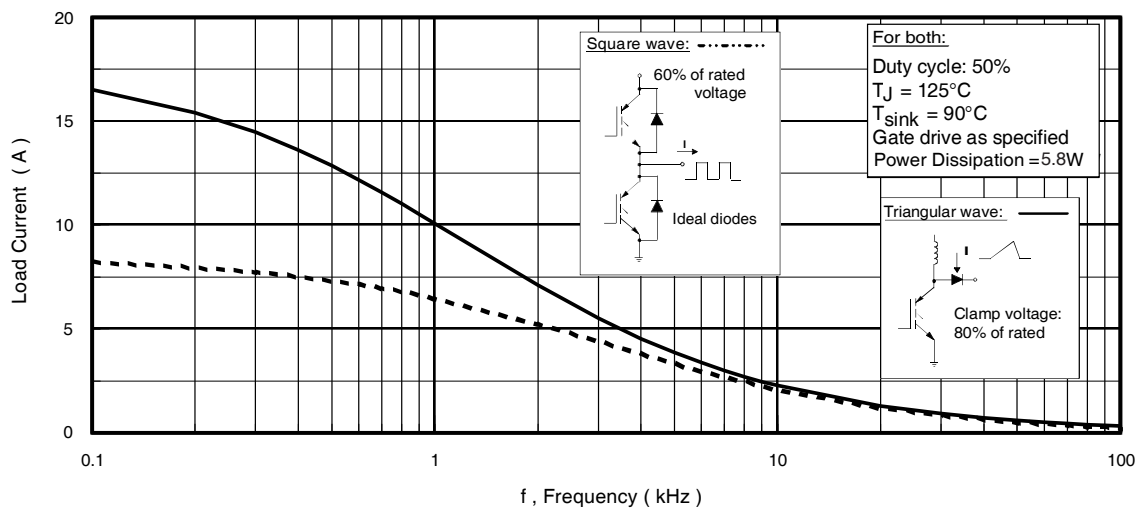


Fig. 1 - Typical Load Current vs. Frequency
(Load Current = I_{RMS} of fundamental)

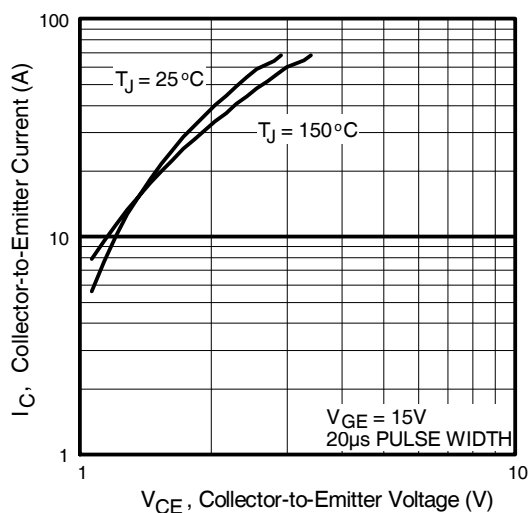


Fig. 2 - Typical Output Characteristics

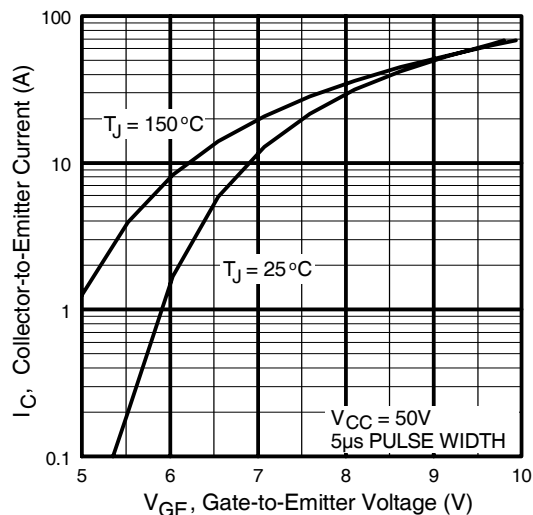


Fig. 3 - Typical Transfer Characteristics

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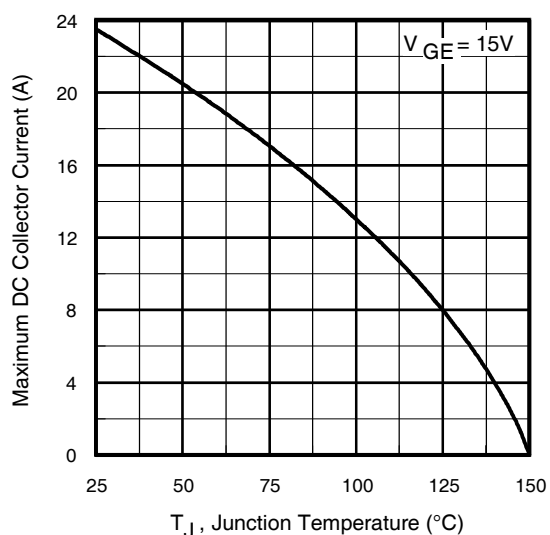


Fig. 4 - Maximum Collector Current vs. Case Temperature

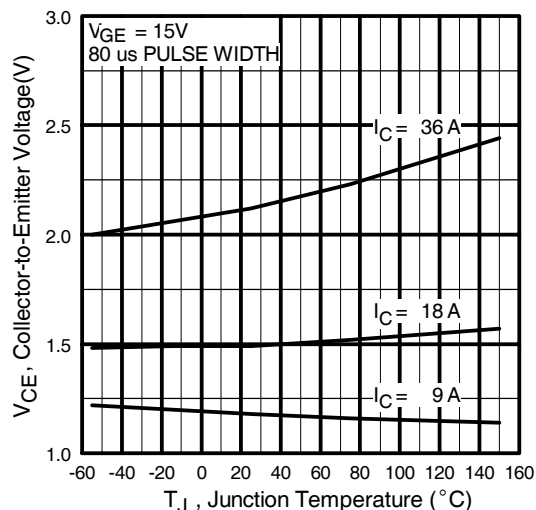


Fig. 5 - Typical Collector-to-Emitter Voltage vs. Junction Temperature

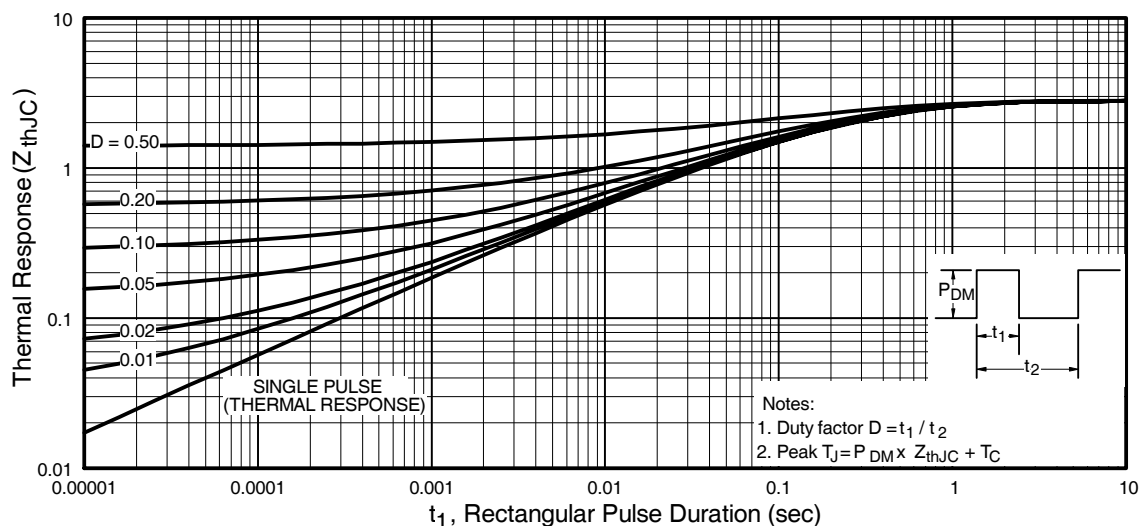


Fig. 6 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

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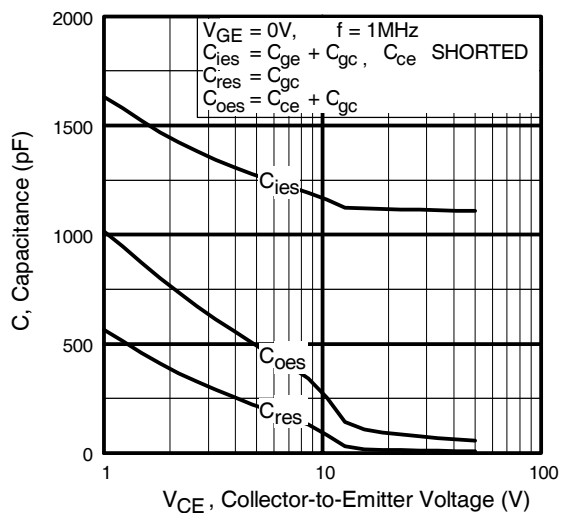


Fig. 7 - Typical Capacitance vs.
Collector-to-Emitter Voltage

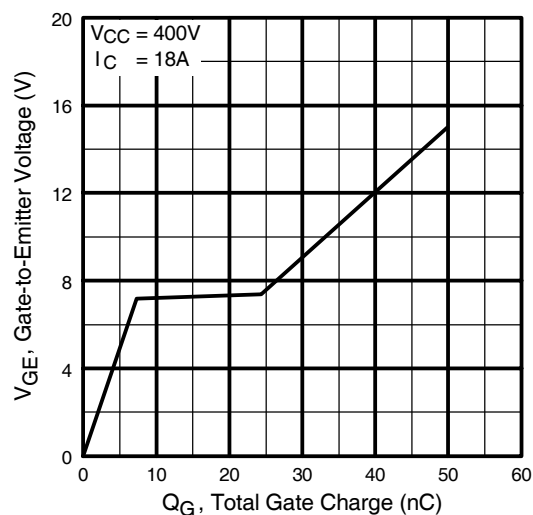


Fig. 8 - Typical Gate Charge vs.
Gate-to-Emitter Voltage

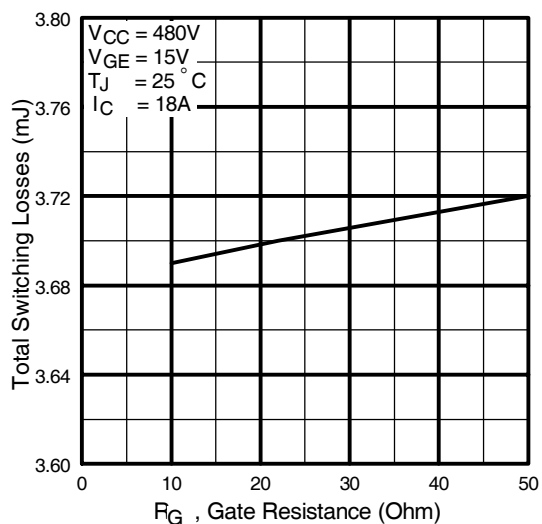


Fig. 9 - Typical Switching Losses vs. Gate
Resistance

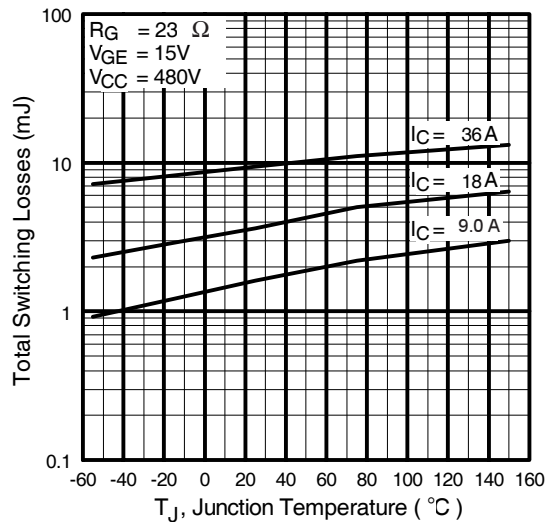


Fig. 10 - Typical Switching Losses vs.
Junction Temperature

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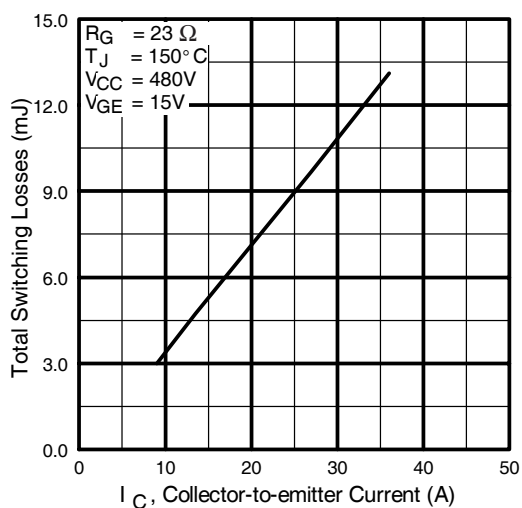


Fig. 11 - Typical Switching Losses vs.
Collector-to-Emitter Current

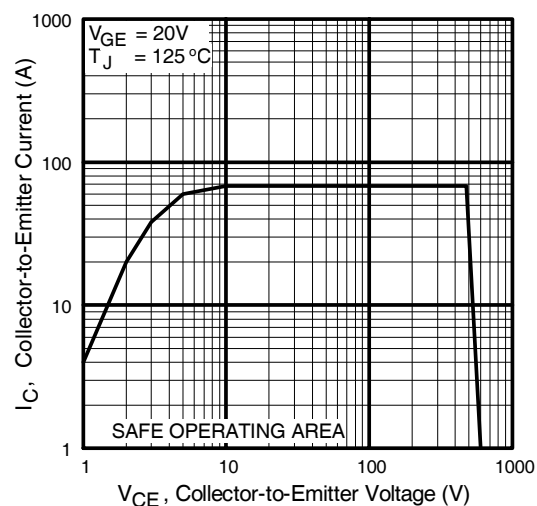


Fig. 12 - Turn-Off SOA

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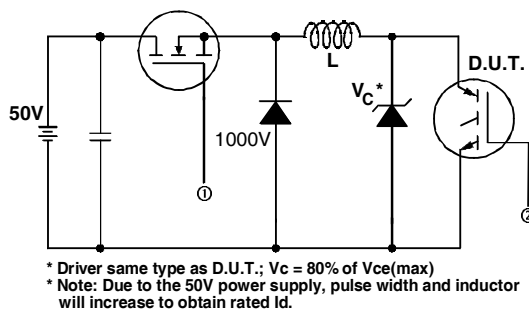


Fig. 13a - Clamped Inductive Load Test Circuit

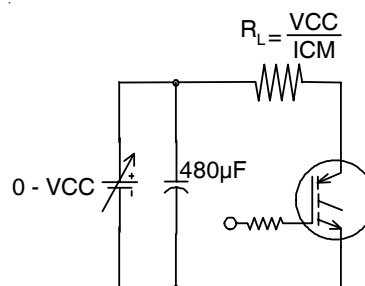


Fig. 13b - Pulsed Collector Current Test Circuit

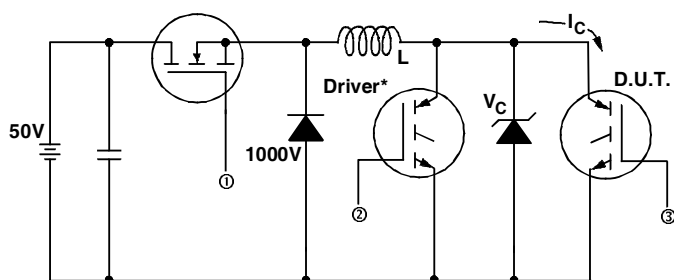


Fig. 14a - Switching Loss Test Circuit

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

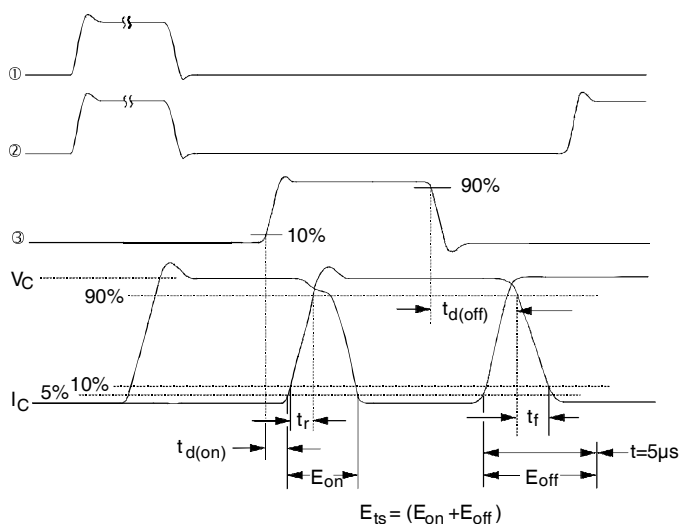
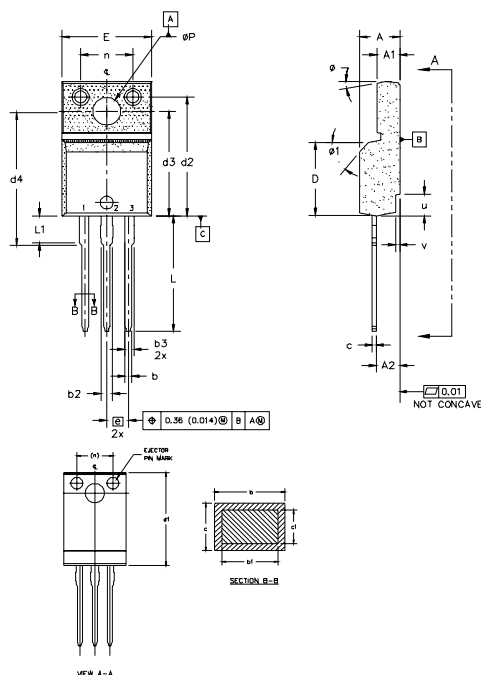


Fig. 14b - Switching Loss Waveforms

IRG4IBC30SPbF TO-220 Full-Pak Package Outline

Dimensions are shown in millimeters (inches)

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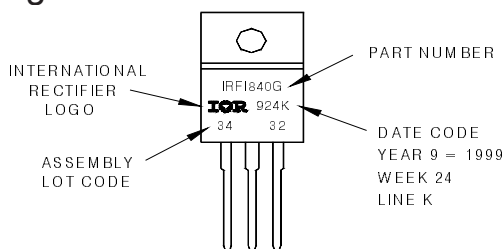
NOTES:
1.0 DIMENSIONING AND TOLERANCING PER ASME Y14.5 M- 1994.
2.0 DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES]
3.0 LEAD DIMENSION AND FINISH UNCONTROLLED IN L1
4.0 DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
5.0 DIMENSION b1 APPLY TO BASE METAL ONLY.
6.0 STEP OPTIONAL (ON PLASTIC BODY DEFINED BY DIMENSIONS u & v).
7.0 CONTROLLING DIMENSION : INCHES.

SYMBOL	DIMENSIONS				NOTES	LEAD ASSIGNMENTS
	MILLIMETERS		INCHES			
	MIN.	MAX.	MIN.	MAX.		
A	4.57	4.83	0.180	0.190		
A1	2.57	2.83	0.101	0.114		
A2	2.51	2.85	0.099	0.112		HEXFET
b	0.622	0.89	0.024	0.035		1. - GATE
b1	0.622	0.838	0.024	0.033	5	2. - DRAIN
b2	1.229	1.400	0.048	0.055		3. - SOURCE
b3	1.229	1.400	0.048	0.055		
c	0.440	0.629	0.017	0.025		
cl	0.440	0.584	0.017	0.023		
D	8.65	9.80	0.341	0.386	4	IGBTs CoPAK
d1	15.80	16.12	0.622	0.635		1. - GATE
d2	13.97	14.22	0.550	0.560		2. - COLLECTOR
d3	12.30	12.92	0.484	0.509		3. - EMITTER
d4	8.64	9.91	0.340	0.390		
E	10.36	10.63	0.408	0.419	4	
e	2.54 BSC		0.100 BSC			
L	13.20	13.73	0.520	0.541	3	
L1	3.10	3.50	0.122	0.138		
n	6.05	6.15	0.238	0.242		
o	3.05	3.45	0.120	0.136		
oP	2.40	2.50	0.094	0.098	6	
u	0.40	0.50	0.016	0.020	6	
v	3"	7"	3"	7"		
ø1	45"	45"	45"	45"		

TO-220 Full-Pak Part Marking Information

EXAMPLE: THIS IS AN IRF1840G
WITH ASSEMBLY
LOT CODE 3432
ASSEMBLED ON WW 24 1999
IN THE ASSEMBLY LINE 'K'

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



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.
This product has been designed and qualified for the Industrial market.
Qualification Standards can be found on IR's Web site.

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