

IRG4IBC30WPbF

INSULATED GATE BIPOLAR TRANSISTOR

Features

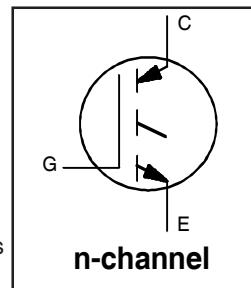
- Designed expressly for Switch-Mode Power Supply and PFC (power factor correction) applications
- 2.5kV, 60s insulation voltage ⑥
- Industry-benchmark switching losses improve efficiency of all power supply topologies
- 50% reduction of E_{off} parameter
- Low IGBT conduction losses
- Latest-generation IGBT design and construction offers tighter parameters distribution, exceptional reliability
- Industry standard Isolated TO-220 Fullpak™ outline
- Lead-Free

Benefits

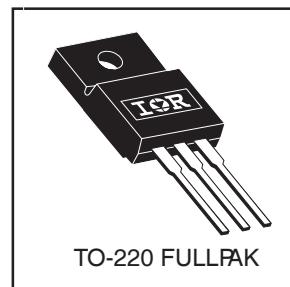
- Lower switching losses allow more cost-effective operation than power MOSFETs up to 150 kHz ("hard switched" mode)
- Of particular benefit to single-ended converters and boost PFC topologies 150W and higher
- Low conduction losses and minimal minority-carrier recombination make these an excellent option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

Absolute Maximum Ratings

	Parameter	Max.	Units
V _{CES}	Collector-to-Emitter Breakdown Voltage	600	V
I _C @ T _C = 25°C	Continuous Collector Current	17	A
I _C @ T _C = 100°C	Continuous Collector Current	8.4	
I _{CM}	Pulsed Collector Current ①	92	
I _{LM}	Clamped Inductive Load Current ②	92	
V _{GE}	Gate-to-Emitter Voltage	± 20	V
E _{ARV}	Reverse Voltage Avalanche Energy ③	180	mJ
P _D @ T _C = 25°C	Maximum Power Dissipation	45	W
P _D @ T _C = 100°C	Maximum Power Dissipation	18	
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)	



$V_{CES} = 600V$
 $V_{CE(on)} \text{ typ.} = 2.1V$
 @ $V_{GE} = 15V, I_C = 12 A$



Thermal Resistance

	Parameter	Typ.	Max.	Units
R _{θJC}	Junction-to-Case - IGBT	—	2.8	°C/W
R _{θJA}	Junction-to-Ambient, typical socket mount	—	65	
Wt	Weight	2.0 (0.07)	—	

IRG4IBC30WPbF

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(\text{BR})\text{CES}}$	Collector-to-Emitter Breakdown Voltage	600	—	—	V	$V_{\text{GE}} = 0\text{V}, I_C = 250\mu\text{A}$
$V_{(\text{BR})\text{ECS}}$	Emitter-to-Collector Breakdown Voltage ④	18	—	—	V	$V_{\text{GE}} = 0\text{V}, I_C = 1.0\text{A}$
$\Delta V_{(\text{BR})\text{CES}/\Delta T_J}$	Temperature Coeff. of Breakdown Voltage	—	0.34	—	V/ $^\circ\text{C}$	$V_{\text{GE}} = 0\text{V}, I_C = 1.0\text{mA}$
$V_{\text{CE}(\text{ON})}$	Collector-to-Emitter Saturation Voltage	—	2.1	2.7	V	$I_C = 12\text{A}$ $V_{\text{GE}} = 15\text{V}$
		—	2.45	—		$I_C = 23\text{A}$ See Fig.2, 5
		—	1.95	—		$I_C = 12\text{A}, T_J = 150^\circ\text{C}$
$V_{\text{GE}(\text{th})}$	Gate Threshold Voltage	3.0	—	6.0		$V_{\text{CE}} = V_{\text{GE}}, I_C = 250\mu\text{A}$
$\Delta V_{\text{GE}(\text{th})/\Delta T_J}$	Temperature Coeff. of Threshold Voltage	—	-11	—	mV/ $^\circ\text{C}$	$V_{\text{CE}} = V_{\text{GE}}, I_C = 250\mu\text{A}$
g_{fe}	Forward Transconductance ⑤	11	16	—	S	$V_{\text{CE}} = 100\text{V}, I_C = 12\text{A}$
I_{CES}	Zero Gate Voltage Collector Current	—	—	250	μA	$V_{\text{GE}} = 0\text{V}, V_{\text{CE}} = 600\text{V}$
		—	—	2.0		$V_{\text{GE}} = 0\text{V}, V_{\text{CE}} = 10\text{V}, T_J = 25^\circ\text{C}$
		—	—	1000		$V_{\text{GE}} = 0\text{V}, V_{\text{CE}} = 600\text{V}, T_J = 150^\circ\text{C}$
I_{GES}	Gate-to-Emitter Leakage Current	—	—	± 100	nA	$V_{\text{GE}} = \pm 20\text{V}$

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
Q_g	Total Gate Charge (turn-on)	—	51	76	nC	$I_C = 12\text{A}$
Q_{ge}	Gate - Emitter Charge (turn-on)	—	7.6	11		$V_{\text{CC}} = 400\text{V}$ See Fig.8
Q_{gc}	Gate - Collector Charge (turn-on)	—	18	27		$V_{\text{GE}} = 15\text{V}$
$t_{d(\text{on})}$	Turn-On Delay Time	—	25	—	ns	$T_J = 25^\circ\text{C}$ $I_C = 12\text{A}, V_{\text{CC}} = 480\text{V}$ $V_{\text{GE}} = 15\text{V}, R_G = 23\Omega$
t_r	Rise Time	—	16	—		
$t_{d(\text{off})}$	Turn-Off Delay Time	—	99	150		
t_f	Fall Time	—	67	100		
E_{on}	Turn-On Switching Loss	—	0.13	—	mJ	Energy losses include "tail" See Fig. 9, 10, 13, 14
E_{off}	Turn-Off Switching Loss	—	0.13	—		
E_{ts}	Total Switching Loss	—	0.26	0.35		
$t_{d(\text{on})}$	Turn-On Delay Time	—	24	—	ns	$T_J = 150^\circ\text{C},$ $I_C = 12\text{A}, V_{\text{CC}} = 480\text{V}$ $V_{\text{GE}} = 15\text{V}, R_G = 23\Omega$ Energy losses include "tail"
t_r	Rise Time	—	17	—		
$t_{d(\text{off})}$	Turn-Off Delay Time	—	150	—		
t_f	Fall Time	—	150	—		
E_{ts}	Total Switching Loss	—	0.55	—	mJ	See Fig. 11, 13, 14
L_E	Internal Emitter Inductance	—	7.5	—	nH	Measured 5mm from package
C_{ies}	Input Capacitance	—	980	—	pF	$V_{\text{GE}} = 0\text{V}$ $V_{\text{CC}} = 30\text{V}$ See Fig. 7 $f = 1.0\text{MHz}$
C_{oes}	Output Capacitance	—	71	—		
C_{res}	Reverse Transfer Capacitance	—	18	—		

Notes:

- ① Repetitive rating; $V_{\text{GE}} = 20\text{V}$, pulse width limited by max. junction temperature. (See fig. 13b)
- ② $V_{\text{CC}} = 80\%(V_{\text{CES}})$, $V_{\text{GE}} = 20\text{V}$, $L = 10\mu\text{H}$, $R_G = 23\Omega$, (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 $t = 60\text{s}$, $f = 60\text{Hz}$

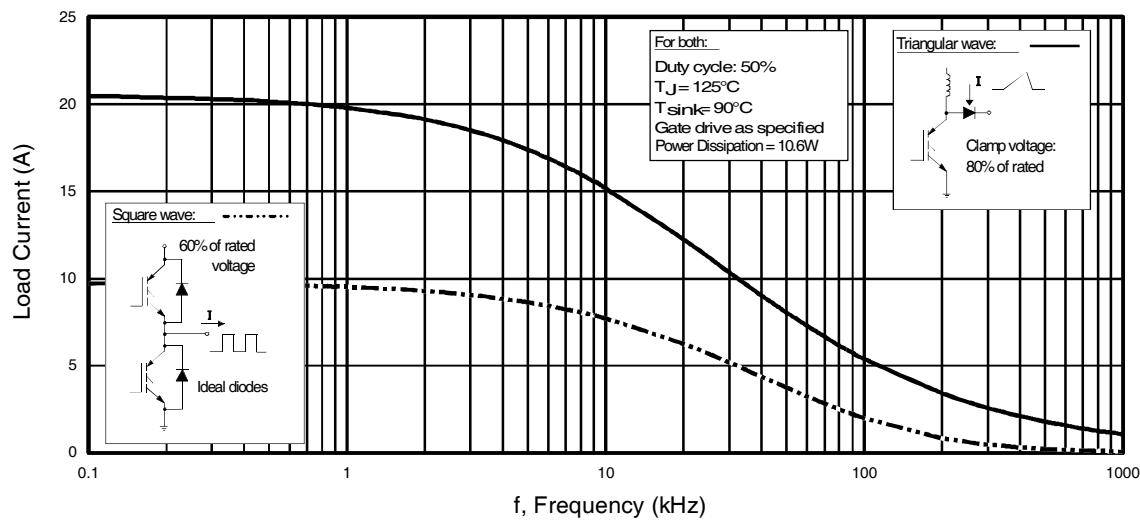


Fig. 1 - Typical Load Current vs. Frequency
 (For square wave, $I=I_{RMS}$ of fundamental; for triangular wave, $I=I_{PK}$)

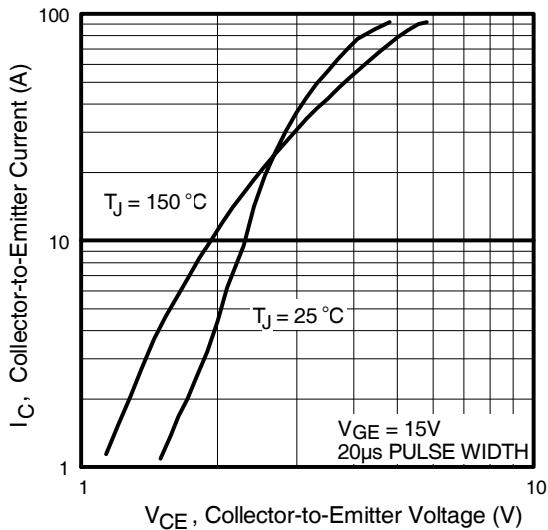


Fig. 2 - Typical Output Characteristics

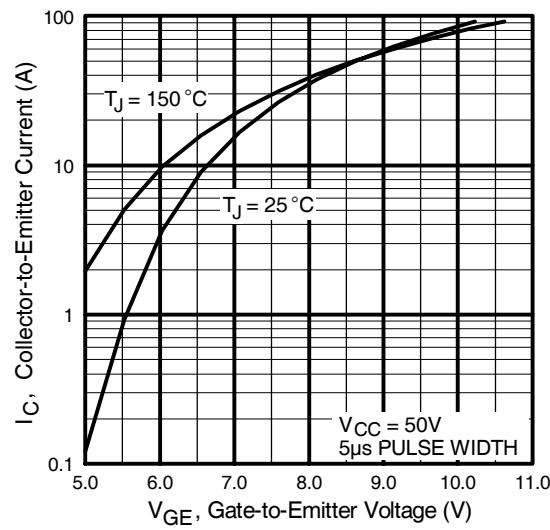


Fig. 3 - Typical Transfer Characteristics

IRG4IBC30WPbF

International
IR Rectifier

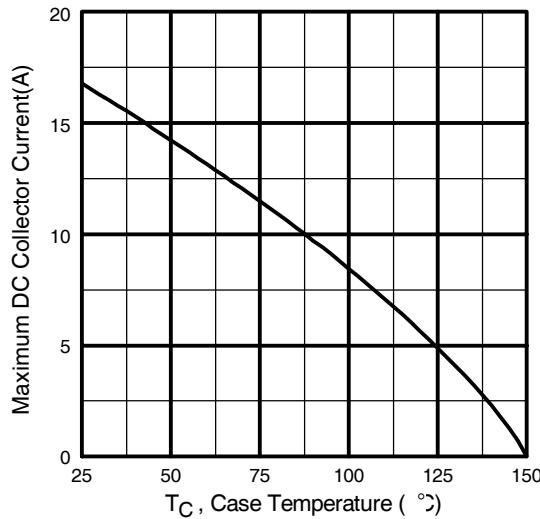


Fig. 4 - Maximum Collector Current vs. Case Temperature

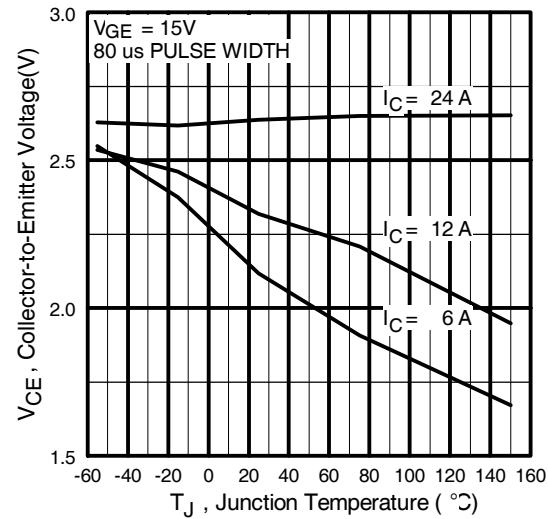


Fig. 5 - Collector-to-Emitter Voltage vs. Junction Temperature

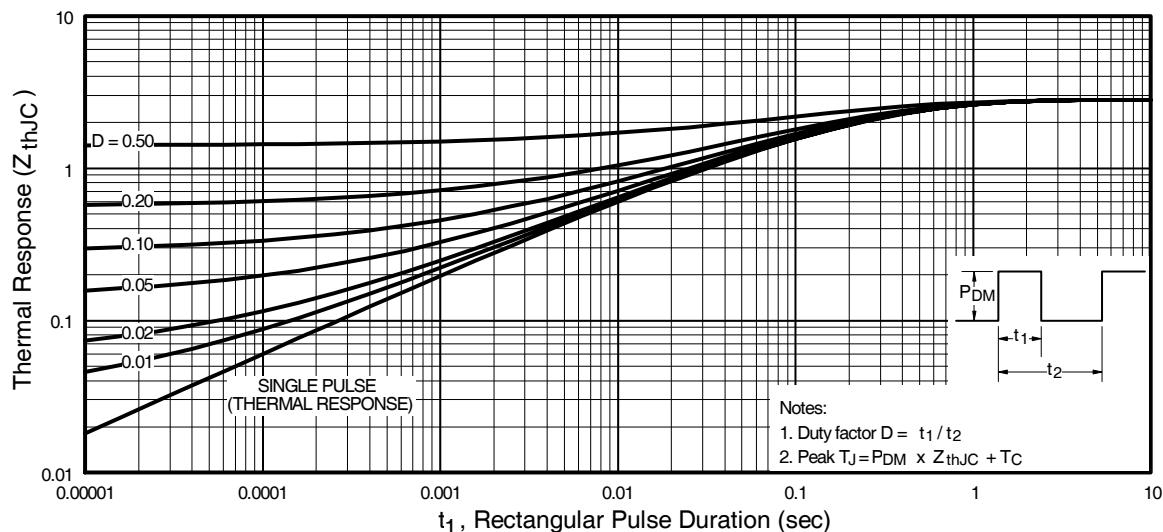
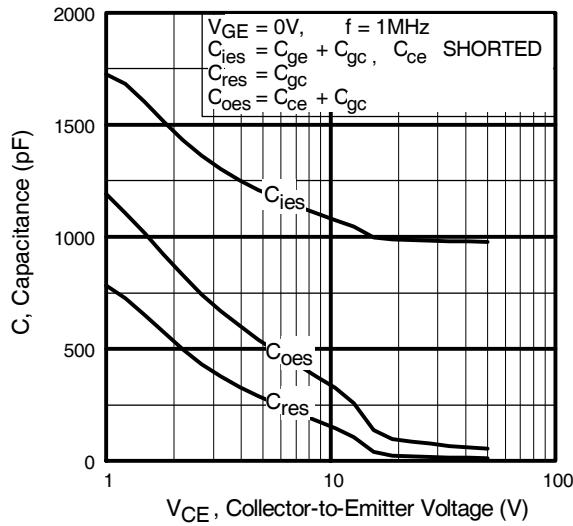
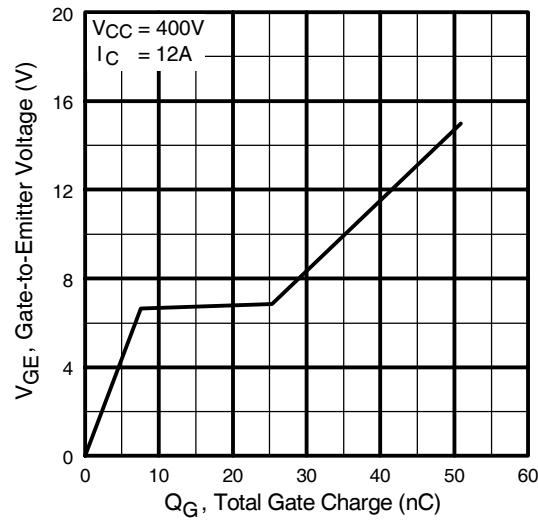


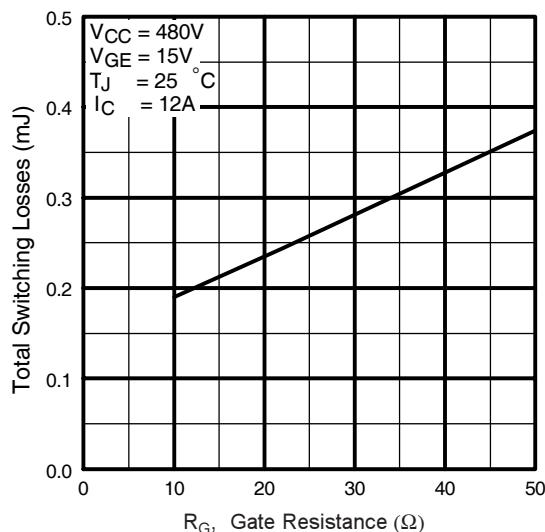
Fig. 6 - Maximum Effective Transient Thermal Impedance, Junction-to-Case



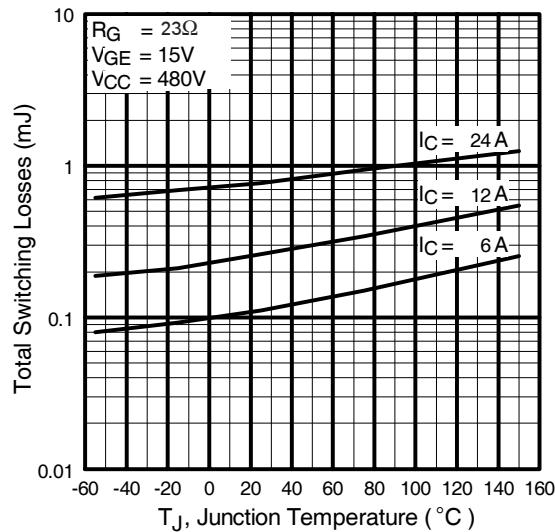
**Fig. 7 - Typical Capacitance vs.
Collector-to-Emitter Voltage**



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



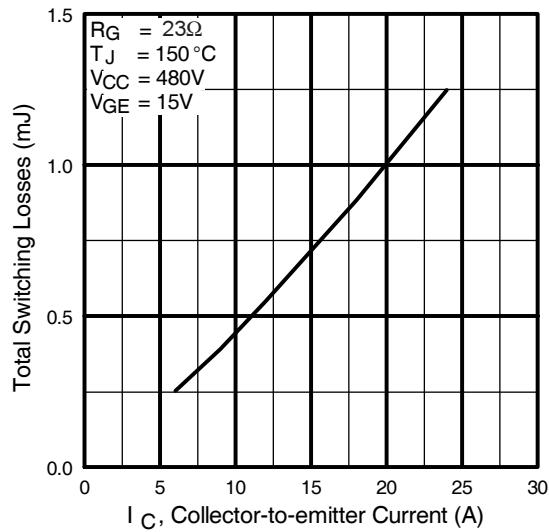
**Fig. 9 - Typical Switching Losses vs. Gate
Resistance**



**Fig. 10 - Typical Switching Losses vs.
Junction Temperature**

IRG4IBC30WPbF

International
Rectifier



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

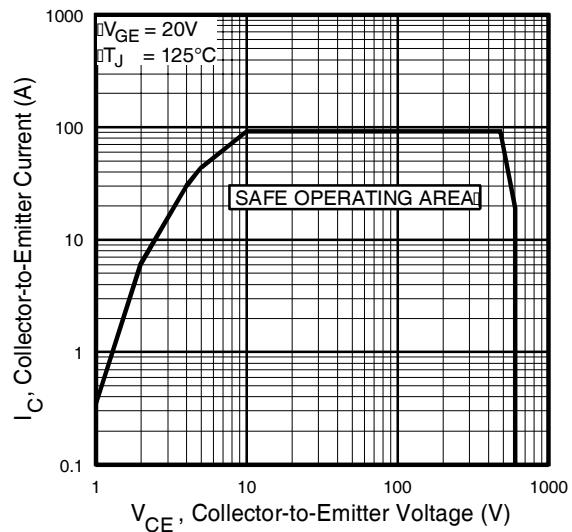
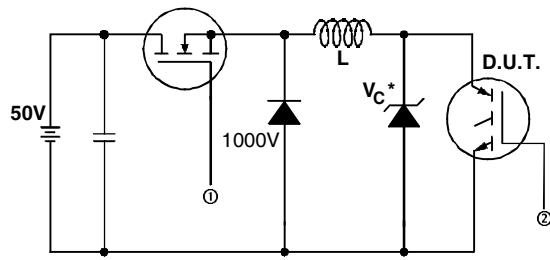


Fig. 12 - Turn-Off SOA



* 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

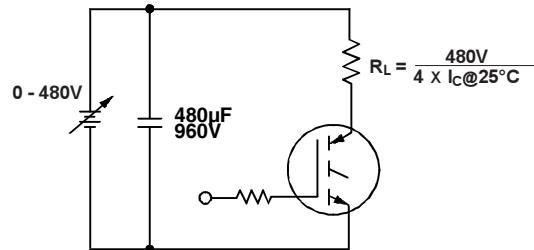


Fig. 13b - Pulsed Collector Current Test Circuit

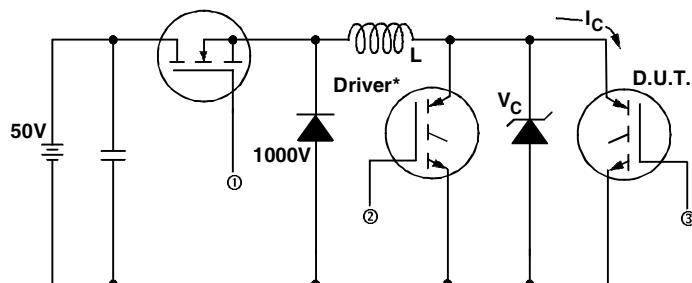


Fig. 14a - Switching Loss Test Circuit

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

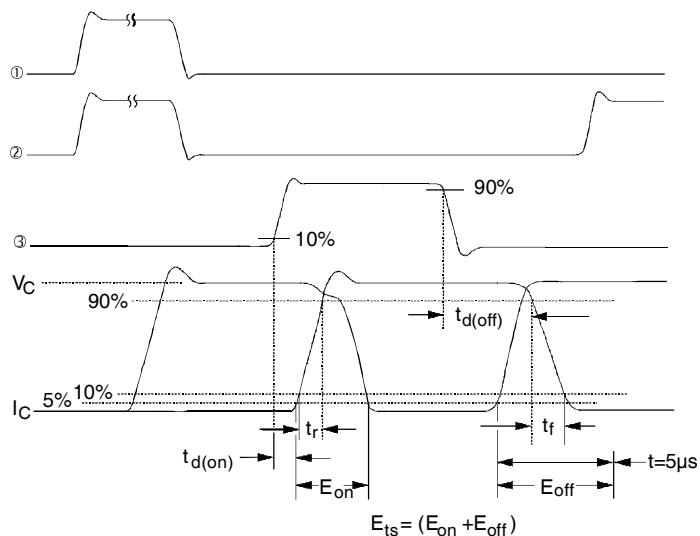


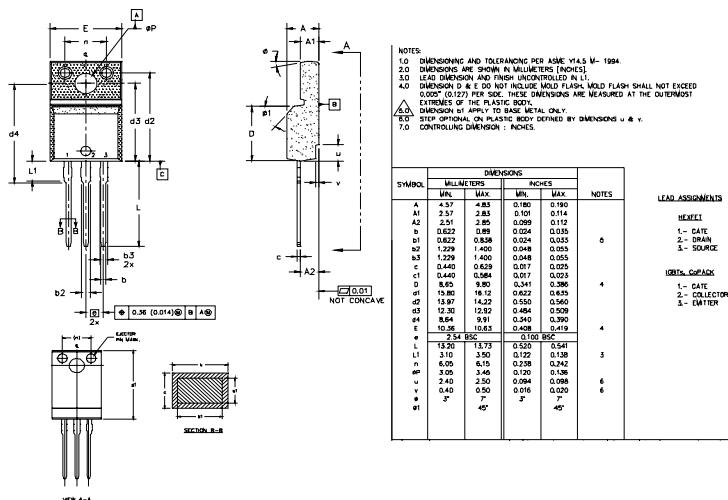
Fig. 14b - Switching Loss Waveforms

IRG4IBC30WPbF

International
IR Rectifier

TO-220 Full-Pak Package Outline

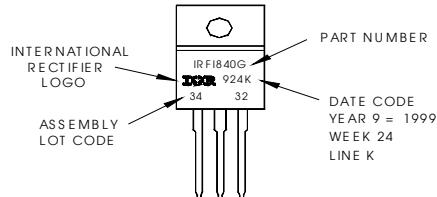
Dimensions are shown in millimeters (inches)



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"



International
IR Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7903

Visit us at www.irf.com for sales contact information.
Data and specifications subject to change without notice. 06/04

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



**Стандарт
Электрон
Связь**

Мы молодая и активно развивающаяся компания в области поставок электронных компонентов. Мы поставляем электронные компоненты отечественного и импортного производства напрямую от производителей и с крупнейших складов мира.

Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

Собственная эффективная логистика и склад в обеспечивает надежную поставку продукции в точно указанные сроки по всей России.

Мы осуществляем техническую поддержку нашим клиентам и предпродажную проверку качества продукции. На все поставляемые продукты мы предоставляем гарантию .

Осуществляем поставки продукции под контролем ВП МО РФ на предприятия военно-промышленного комплекса России , а также работаем в рамках 275 ФЗ с открытием отдельных счетов в уполномоченном банке. Система менеджмента качества компании соответствует требованиям ГОСТ ISO 9001.

Минимальные сроки поставки, гибкие цены, неограниченный ассортимент и индивидуальный подход к клиентам являются основой для выстраивания долгосрочного и эффективного сотрудничества с предприятиями радиоэлектронной промышленности, предприятиями ВПК и научно-исследовательскими институтами России.

С нами вы становитесь еще успешнее!

Наши контакты:

Телефон: +7 812 627 14 35

Электронная почта: sales@st-electron.ru

Адрес: 198099, Санкт-Петербург,
Промышленная ул, дом № 19, литер Н,
помещение 100-Н Офис 331