

International IR Rectifier

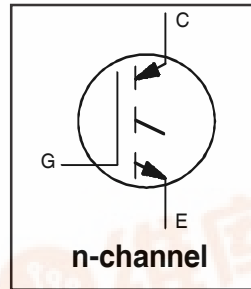
PD-95882

IRGP4050

PDP Switch

Features

- Key parameters optimized for PDP sustain & Energy recovery applications
- 104A continuous collector current rating reduces component count
- High pulse current rating makes it ideal for capacitive load circuits
- Low temperature co-efficient of $V_{CE(ON)}$ ensures reduced power dissipation at operating junction temperatures
- Reverse voltage avalanche rating improves the robustness in sustain driver application
- Short fall & rise times for fast switching



$V_{CES} = 250V$
$V_{CE(ON) typ.} = 1.64V$
@ $V_{GE} = 15V, I_C = 30A$



Description

This IGBT is specifically designed for sustain & energy recovery application in plasma display panels. This IGBT features low $V_{CE(ON)}$ and fast switching times to improve circuit efficiency and reliability. Low temperature co-efficient of $V_{CE(ON)}$ makes this IGBT an ideal device for PDP sustain driver application.

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{CES}	Collector-to-Emitter Voltage	250	V
$I_C @ T_C = 25^\circ C$	Continuous Collector Current	104*	A
$I_C @ T_C = 100^\circ C$	Continuous Collector Current	56	
I_{CM}	Pulse Collector Current ①	208	
I_{LM}	Clamped Inductive Load current ②	290	
V_{GE}	Gate-to-Emitter Voltage	± 20	V
E_{ARV}	Reverse Voltage Avalanche Energy ③	1240	mJ
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	330	W
$P_D @ T_C = 100^\circ C$	Maximum Power Dissipation	130	
T_J	Operating Junction and	-55 to +150	°C
T_{STG}	Storage Temperature Range		
	Solder Temperature Range, for 10 sec.	300 (0.063 in. (1.6mm) from case)	

Thermal / Mechanical Characteristics

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case- IGBT	—	—	0.38	°C/W
$R_{\theta CS}$	Case-to-Sink, flat, greased surface	—	0.24	—	
$R_{\theta JA}$	Junction-to-Ambient, typical socket mount	—	—	40	
Wt	Weight	—	6 (0.21)	—	g (oz.)

*Package limited to 60A.



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

Parameter	Min.	Typ.	Max.	Units	Conditions	
$V_{(BR)CES}$	250	—	—	V	$V_{GE} = 0V, I_C = 250\mu A$	
$V_{(BR)ECS}$	18	—	—	V	$V_{GE} = 0V, I_C = 1.0A$	
$\Delta V_{(BR)CES}/\Delta T_J$	—	8.2	—	mV/ $^\circ\text{C}$	$V_{GE} = 0V, I_C = 1mA$	
$V_{CE(on)}$	Collector-to-Emitter Saturation Voltage	—	1.64	1.90	V	$I_C = 30A$ $I_C = 56A$ $I_C = 104A, T_J = 150^\circ\text{C}$ $V_{GE} = 15V$ See Fig. 2, 5
		—	2.04	—		
		—	2.60	—		
$V_{GE(th)}$	3.0	—	6.0		$V_{CE} = V_{GE}, I_C = 250\mu A$	
$\Delta V_{GE(th)}/\Delta T_J$	—	-11	—	mV/ $^\circ\text{C}$	$V_{CE} = V_{GE}, I_C = 0.25mA$	
g_{fe}	34	51	—	S	$V_{CE} = 100V, I_C = 56A$	
I_{CES}	Zero Gate Voltage Collector Current	—	—	250	μA	$V_{GE} = 0V, V_{CE} = 250V$
		—	—	2.0		$V_{GE} = 0V, V_{CE} = 10V$
		—	—	5000		$V_{GE} = 0V, V_{CE} = 250V, T_J = 150^\circ\text{C}$
I_{GES}	—	—	± 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	—	230	350	nC	$I_C = 56A$ $V_{CC} = 200V$ $V_{GE} = 15V$ See Fig. 8	
Q_{ge}	—	37	56			
Q_{gc}	—	78	120			
$t_{d(on)}$	—	37	—	ns	$T_J = 25^\circ\text{C}$ $I_C = 30A, V_{CC} = 180V$ $V_{GE} = 15V, R_G = 5.0\Omega$ Energy losses include "tail"	
t_r	—	35	—			
$t_{d(off)}$	—	120	180			
t_f	—	59	89			
E_{on}	—	45	—			μJ
E_{off}	—	125	—			
E_{TS}	—	170	—			
$t_{d(on)}$	—	35	—	ns	$T_J = 150^\circ\text{C}$ $I_C = 30A, V_{CC} = 180V$ $V_{GE} = 15V, R_G = 5.0\Omega$ Energy losses include "tail"	
t_r	—	35	—			
$t_{d(off)}$	—	130	—			
t_f	—	120	—			
E_{TS}	—	280	—	μJ	See Fig. 11, 14	
L_E	—	13	—	nH	Measured 5mm from package	
C_{ies}	—	4650	—	pF	$V_{GE} = 0V$ $V_{CC} = 30V,$ $f = 1.0MHz$ See Fig. 7	
C_{oes}	—	480	—			
C_{res}	—	92	—			

Notes:

- ① Repetitive rating; $V_{GE} = 20V$, pulse width limited by max. junction temperature. (See fig. 13b)
- ② $V_{CC} = 80\%(V_{CES})$; $V_{GE} = 20V$, $L = 10\mu H$, $R_G = 5.0\Omega$, (See fig. 13a).
- ③ Repetitive rating; pulse width limited by maximum junction temperature.
- ④ Pulse width $\leq 2.5ms$; duty factor $\leq 0.1\%$.
- ⑤ Pulse width $5.0\mu s$, single shot.

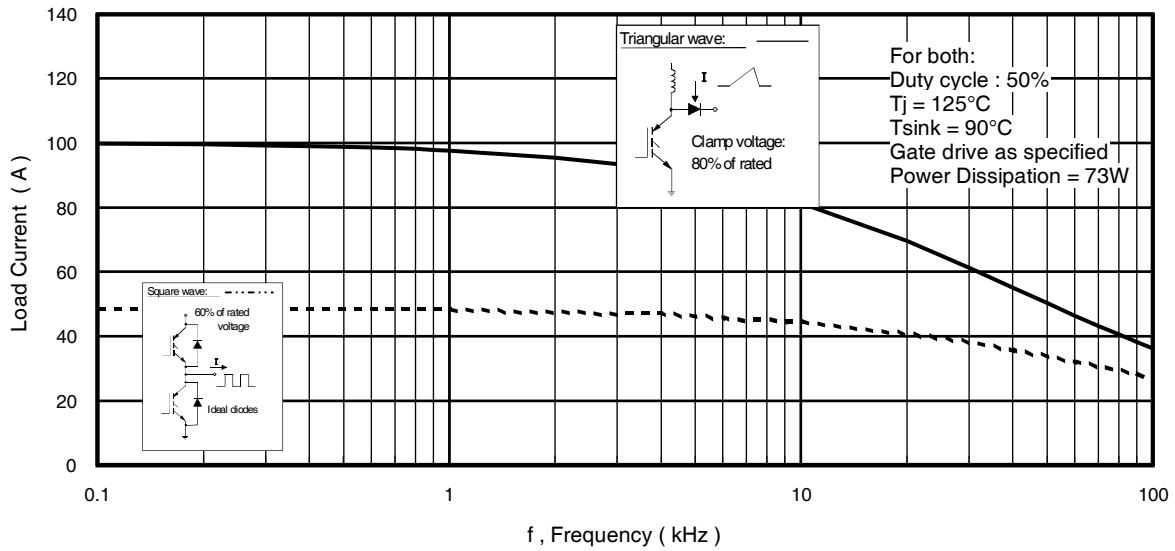


Fig. 1 - Typical Load Current vs. Frequency
(Load Current = I_{RMS} of fundamental)

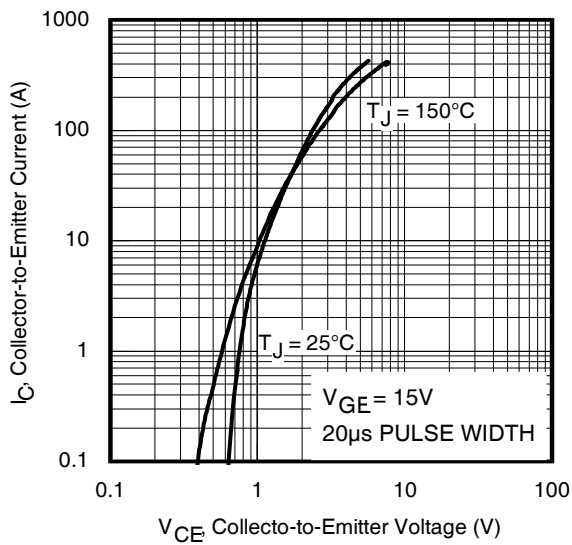


Fig. 2 - Typical Output Characteristics

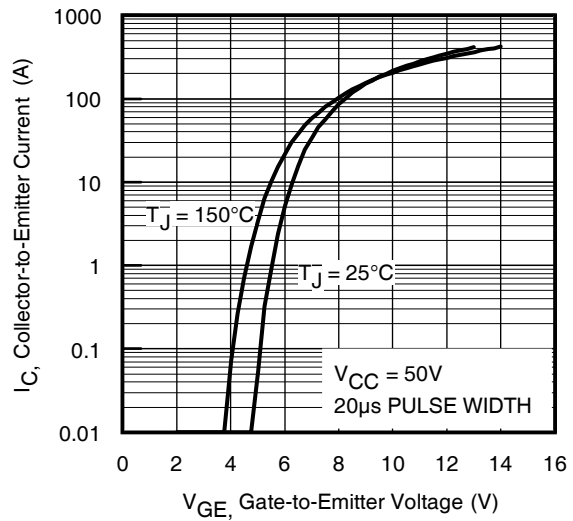


Fig. 3 - Typical Transfer Characteristics

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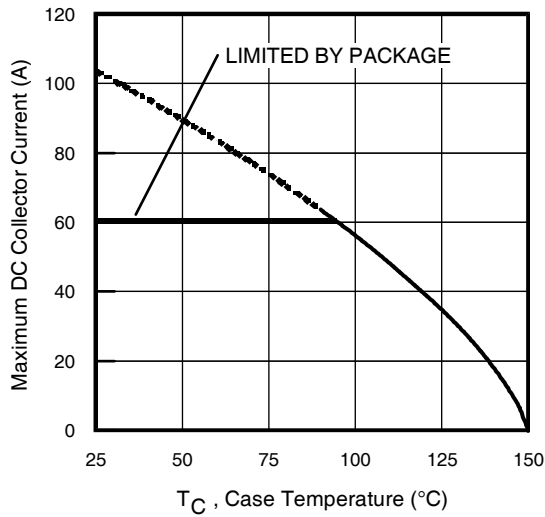


Fig. 4 - Maximum Collector Current vs. Case Temperature

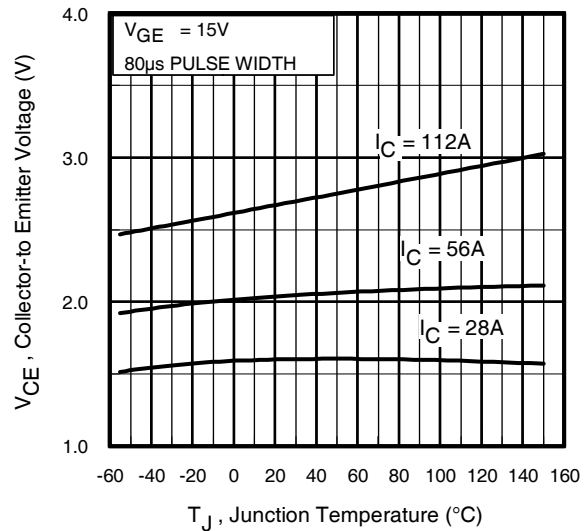


Fig. 5 - Typical Collector-to-Emitter Voltage vs. Junction Temperature

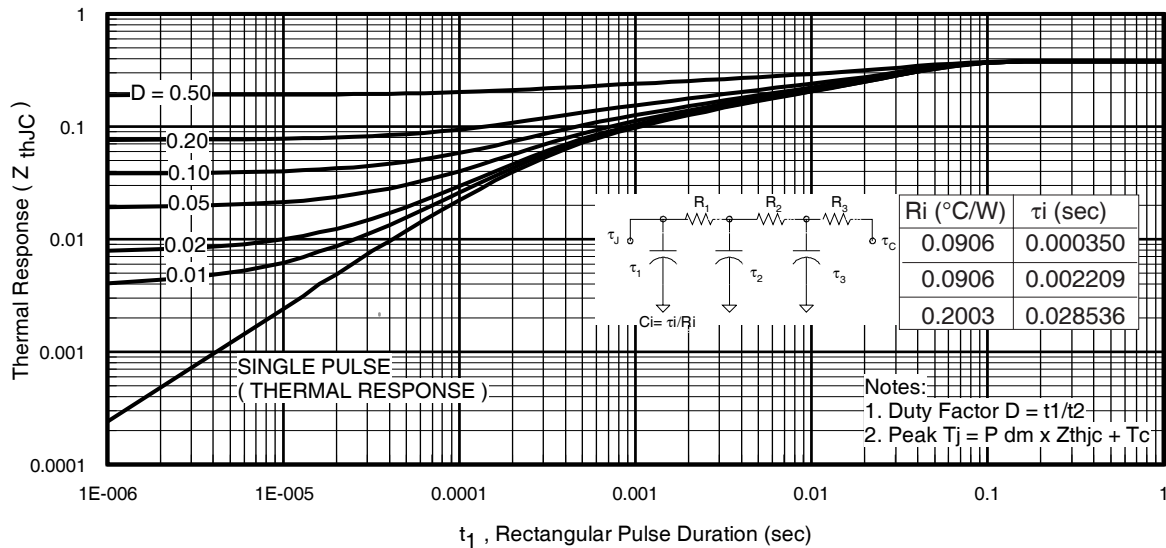


Fig. 6 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

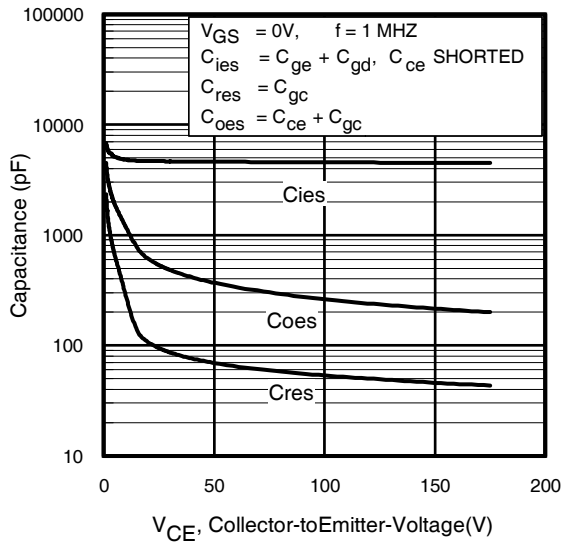


Fig. 7 - Typical Capacitance vs. Collector-to-Emitter Voltage

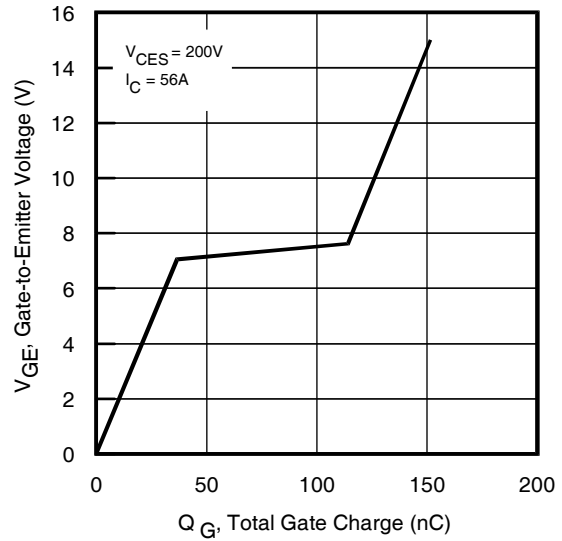


Fig. 8 - Typical Gate Charge vs. Gate-to-Emitter Voltage

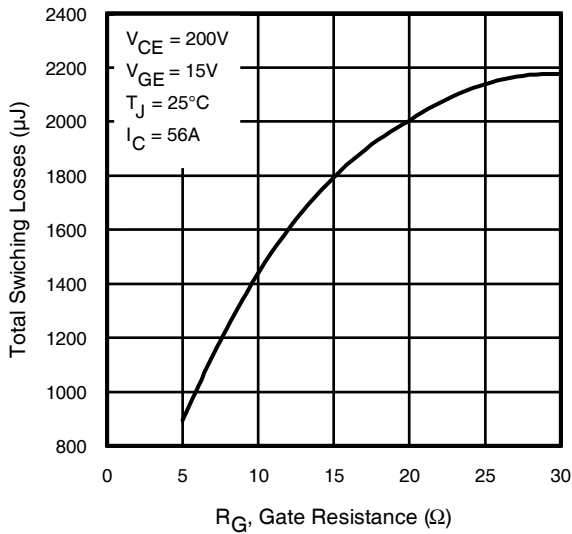


Fig. 9 - Typical Switching Losses vs. Gate Resistance

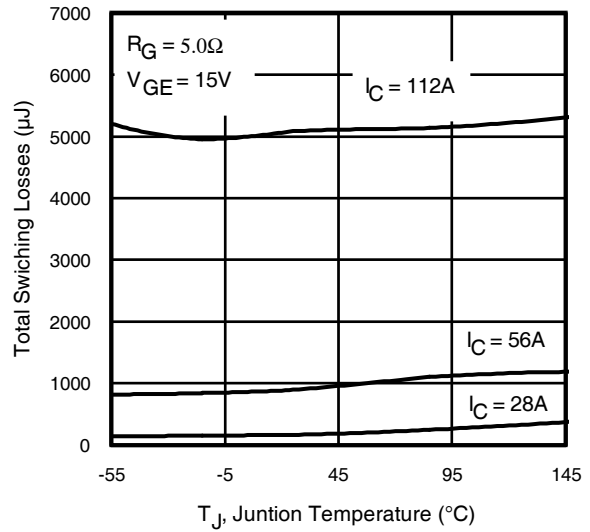


Fig. 10 - Typical Switching Losses vs. Junction Temperature

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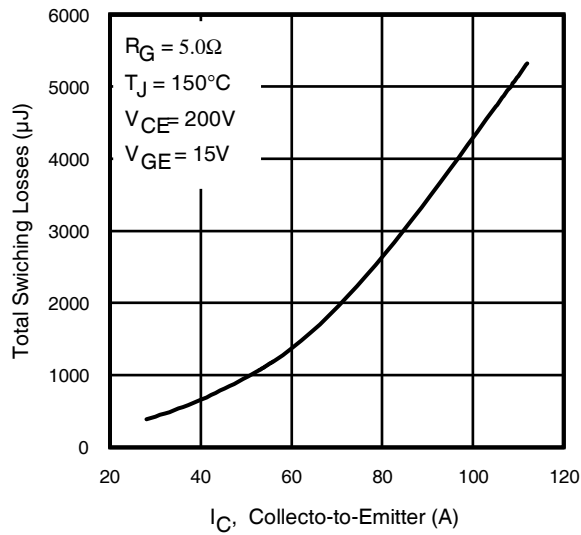


Fig. 11 - Typical Switching Losses vs. Collector-to-Emitter Current

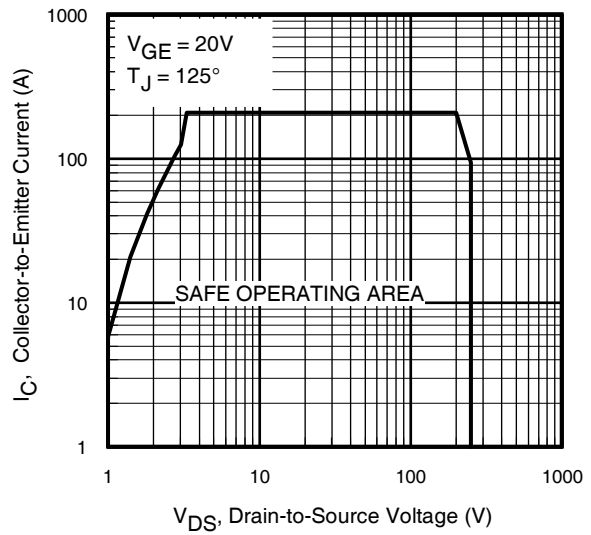
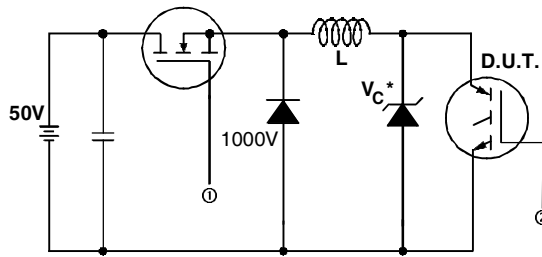


Fig. 12 - Turn-Off SOA



* 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

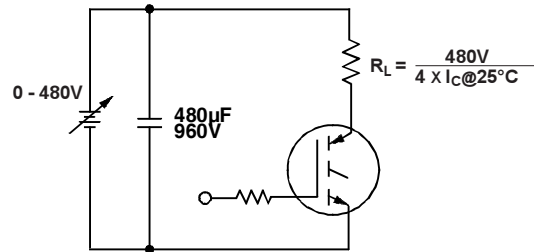


Fig. 13b - Pulsed Collector Current Test Circuit

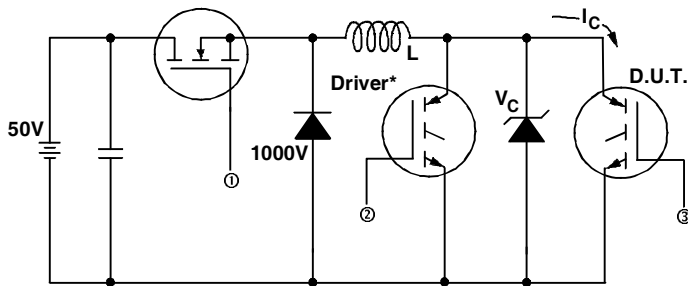


Fig. 14a - Switching Loss Test Circuit

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

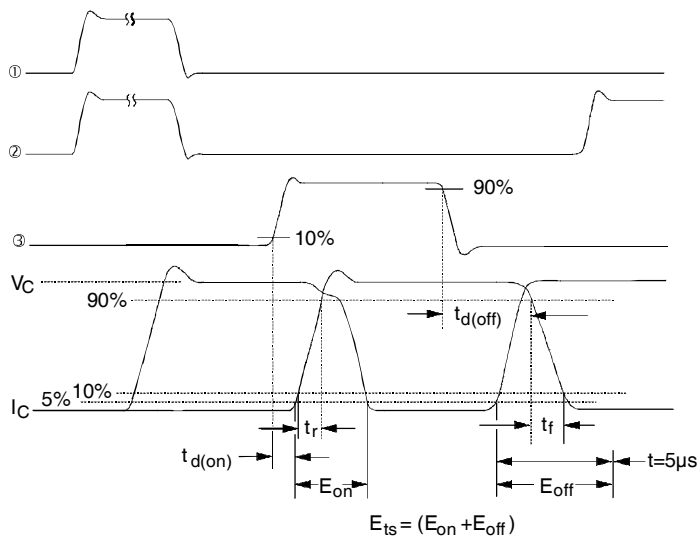


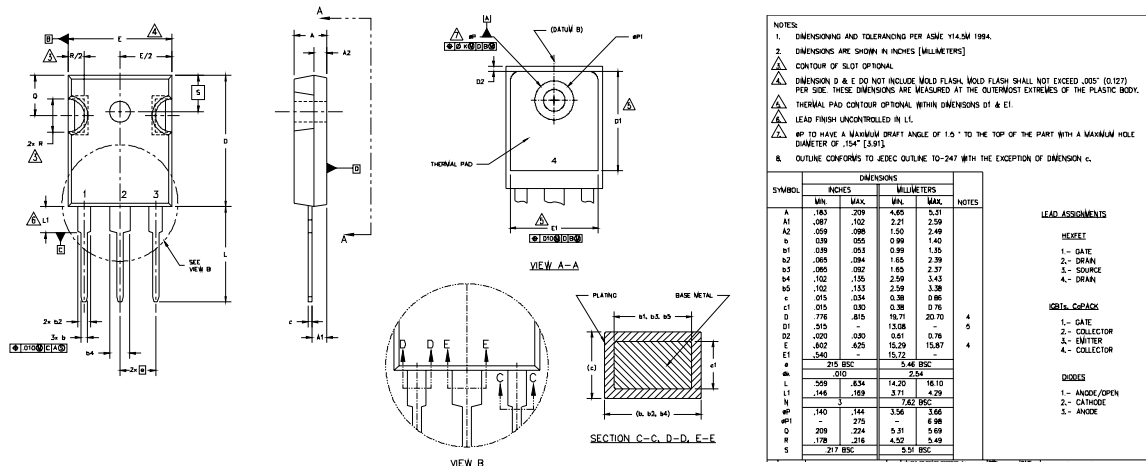
Fig. 14b - Switching Loss Waveforms

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TO-247AC Package Outline

Dimensions are shown in millimeters (inches)

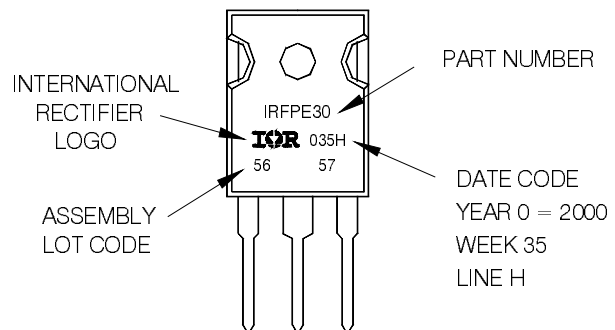
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TO-247AC Part Marking Information

EXAMPLE: THIS IS AN IRFPE30
WITH ASSEMBLY
LOT CODE 5657
ASSEMBLED ON WW 35, 2000
IN THE ASSEMBLY LINE "H"

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



TO-247AC package is not recommended for Surface Mount Application.

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

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