

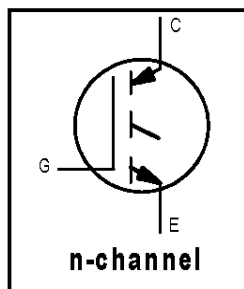
IRG4BC30U-SPbF

INSULATED GATE BIPOLAR TRANSISTOR

UltraFast Speed IGBT

Features

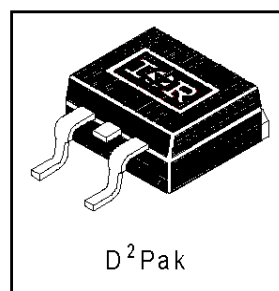
- UltraFast: Optimized for high operating frequencies 8-40 kHz in hard switching, >200 kHz in resonant mode
- Generation 4 IGBT design provides tighter parameter distribution and higher efficiency than Generation 3
- Industry standard D²Pak package
- Lead-Free



$V_{CES} = 600V$
$V_{CE(on) typ.} = 1.95V$
@ $V_{GE} = 15V, I_C = 12A$

Benefits

- Generation 4 IGBT's offer highest efficiency available
- IGBT's optimized for specified application conditions
- Designed to be a "drop-in" replacement for equivalent industry-standard Generation 3 IR IGBT's



D²Pak

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	A
$I_C @ T_C = 100^{\circ}C$	Continuous Collector Current	12	
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	10	mJ
$P_D @ T_C = 25^{\circ}C$	Maximum Power Dissipation	100	W
$P_D @ T_C = 100^{\circ}C$	Maximum Power Dissipation	42	
T_J	Operating Junction and	-55 to + 150	
T_{STG}	Storage Temperature Range		

Thermal Resistance

	Parameter	Typ.	Max.	Units
R_{qJC}	Junction-to-Case	—	1.2	$^{\circ}C/W$
R_{qJA}	Junction-to-Ambient, (PCB Mounted, steady-state)*	—	40	

* When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994.

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	$V_{GE} = 0V, I_C = 1.0A$
$DV_{(BR)CES}/DT_J$	Temperature Coeff. of Breakdown Voltage	—	0.63	—	$V/^\circ\text{C}$	$V_{GE} = 0V, I_C = 1.0mA$
$V_{CE(ON)}$	Collector-to-Emitter Saturation Voltage	—	1.95	2.1	V	$I_C = 12A, V_{GE} = 15V$
		—	2.52	—		$I_C = 23A, V_{GE} = 15V$
		—	2.09	—		$I_C = 12A, T_J = 150^\circ\text{C}$
$V_{GE(th)}$	Gate Threshold Voltage	3.0	—	6.0		$V_{CE} = V_{GE}, I_C = 250\mu A$
$DV_{GE(th)}/DT_J$	Temperature Coeff. of Threshold Voltage	—	-13	—	$mV/^\circ\text{C}$	$V_{CE} = V_{GE}, I_C = 250\mu A$
g_{fe}	Forward Transconductance ⑤	3.1	8.6	—	S	$V_{CE} = 100V, I_C = 12A$
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	$I_C = 12A$
Q_{ge}	Gate - Emitter Charge (turn-on)	—	8.1	12		$V_{CC} = 400V$
Q_{gc}	Gate - Collector Charge (turn-on)	—	18	27		$V_{GE} = 15V$
$t_{d(on)}$	Turn-On Delay Time	—	17	—	ns	$T_J = 25^\circ\text{C}$
t_r	Rise Time	—	9.6	—		$I_C = 12A, V_{CC} = 480V$
$t_{d(off)}$	Turn-Off Delay Time	—	78	120		$V_{GE} = 15V, R_G = 23\Omega$
t_f	Fall Time	—	97	150		Energy losses include "tail"
E_{on}	Turn-On Switching Loss	—	0.16	—	mJ	See Fig. 10, 11, 13, 14
E_{off}	Turn-Off Switching Loss	—	0.20	—		
E_{ts}	Total Switching Loss	—	0.36	0.50		
$t_{d(on)}$	Turn-On Delay Time	—	20	—	ns	$T_J = 150^\circ\text{C}$
t_r	Rise Time	—	13	—		$I_C = 12A, V_{CC} = 480V$
$t_{d(off)}$	Turn-Off Delay Time	—	180	—		$V_{GE} = 15V, R_G = 23\Omega$
t_f	Fall Time	—	140	—		Energy losses include "tail"
E_{ts}	Total Switching Loss	—	0.73	—	mJ	See Fig. 13, 14
L_E	Internal Source Inductance	—	7.5	—	nH	Measured 5mm from package
C_{ies}	Input Capacitance	—	1100	—	pF	$V_{GE} = 0V$
C_{oes}	Output Capacitance	—	73	—		$V_{CC} = 30V$
C_{res}	Reverse Transfer Capacitance	—	14	—		$f = 1.0MHz$

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.

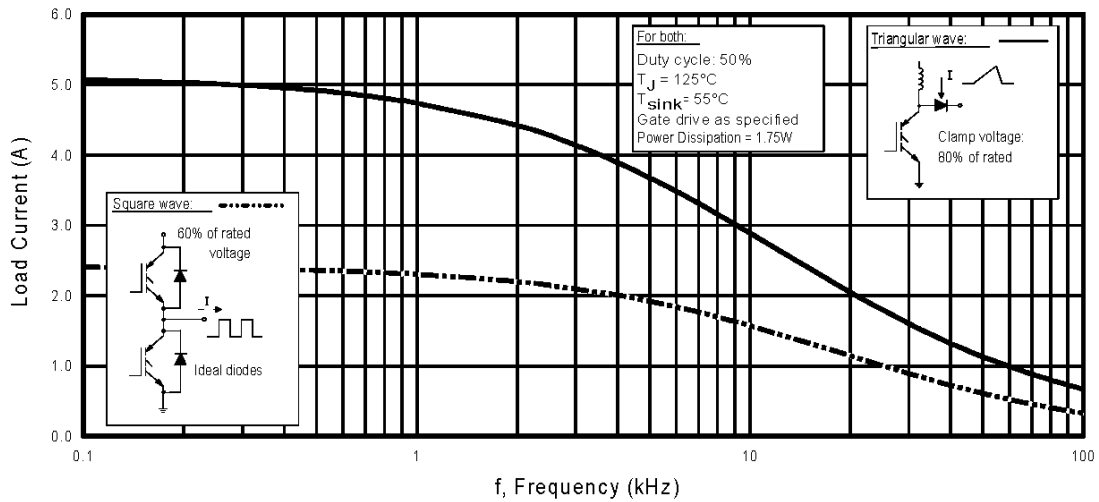


Fig. 1 - Typical Load Current vs. Frequency
(For square wave, $I = I_{\text{RMS}}$ of fundamental; for triangular wave, $I = I_{\text{PK}}$)

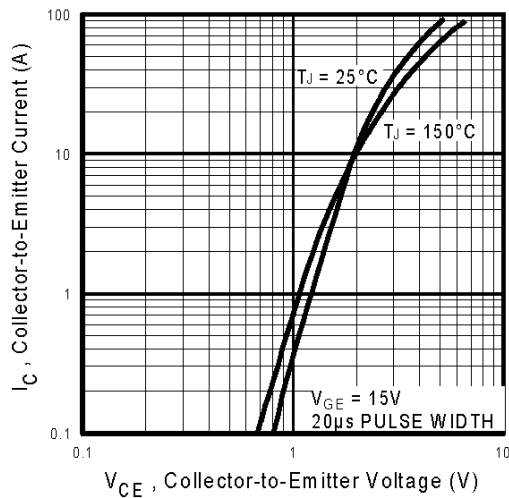


Fig. 2 - Typical Output Characteristics

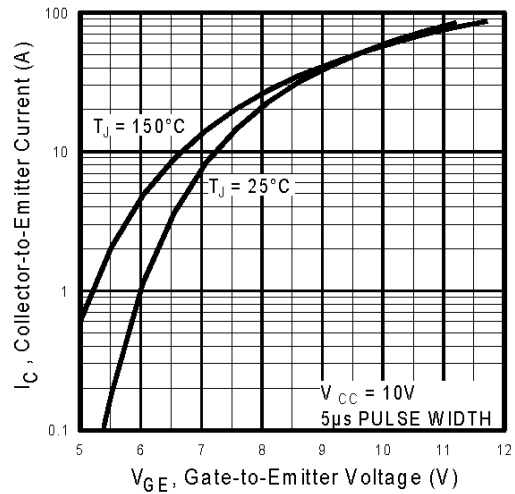


Fig. 3 - Typical Transfer Characteristics

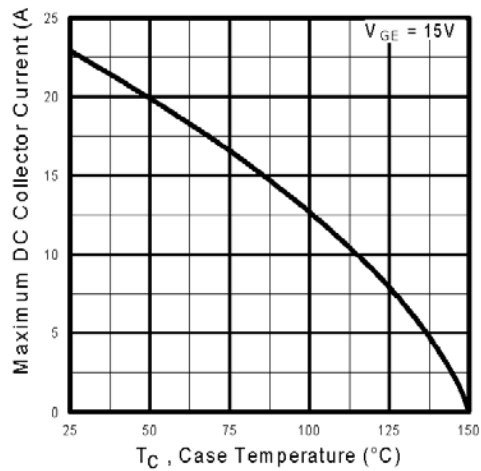


Fig. 4 - Maximum Collector Current vs. Case Temperature

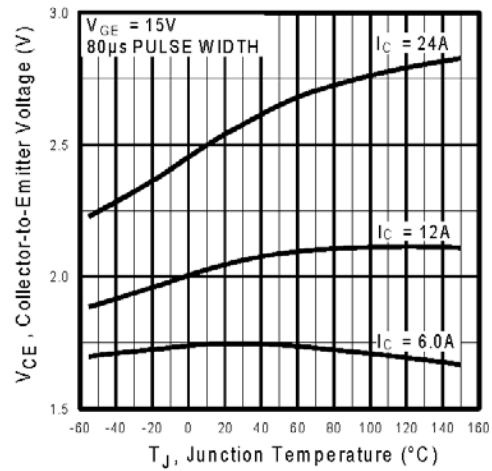


Fig. 5 - Collector-to-Emitter Voltage vs. Junction Temperature

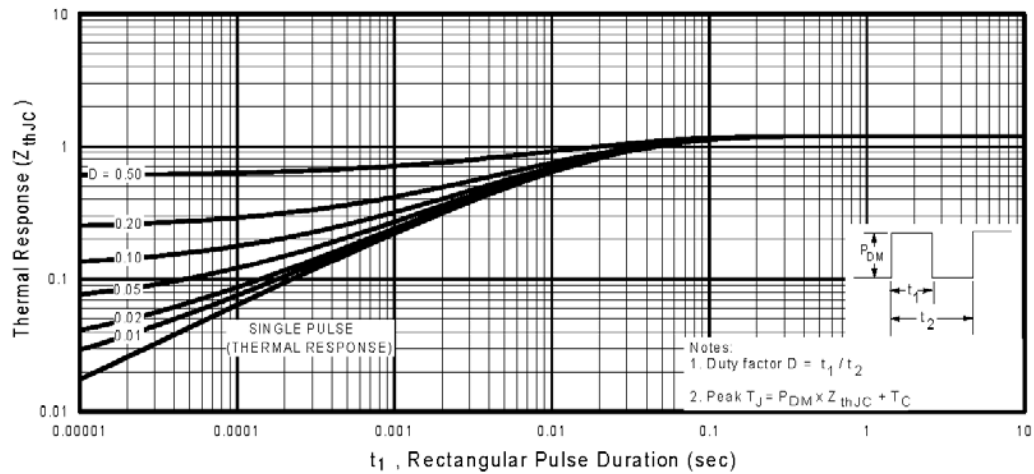


Fig. 6 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

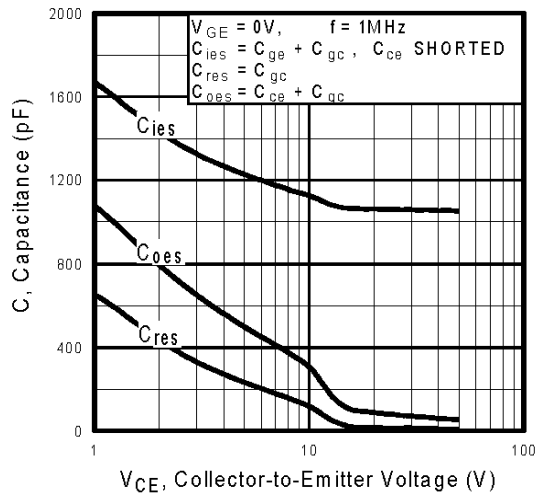


Fig. 7 - Typical Capacitance vs. Collector-to-Emitter Voltage

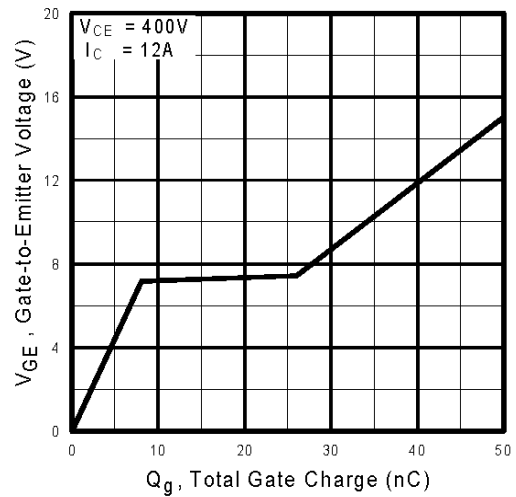


Fig. 8 - Typical Gate Charge vs. Gate-to-Emitter Voltage

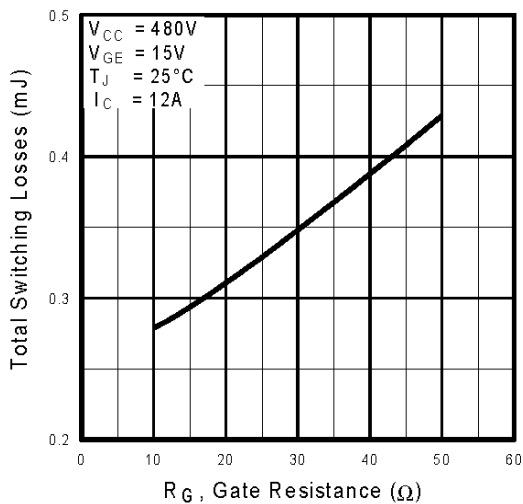


Fig. 9 - Typical Switching Losses vs. Gate Resistance

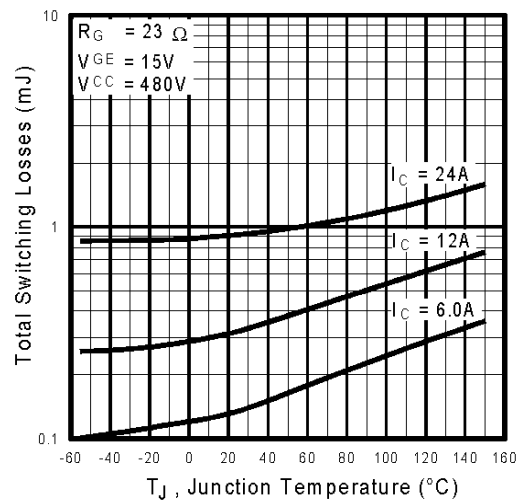


Fig. 10 - Typical Switching Losses vs. Junction Temperature

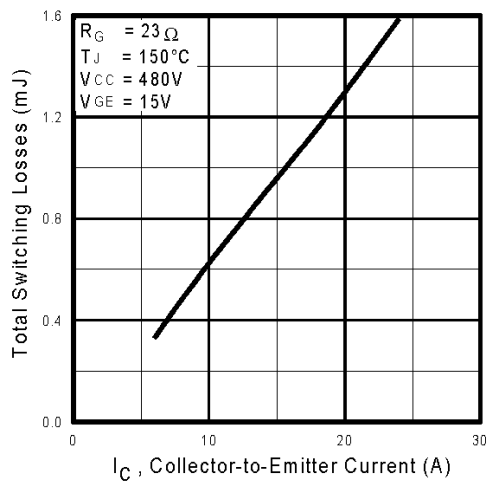


Fig. 11 - Typical Switching Losses vs. Collector-to-Emitter Current

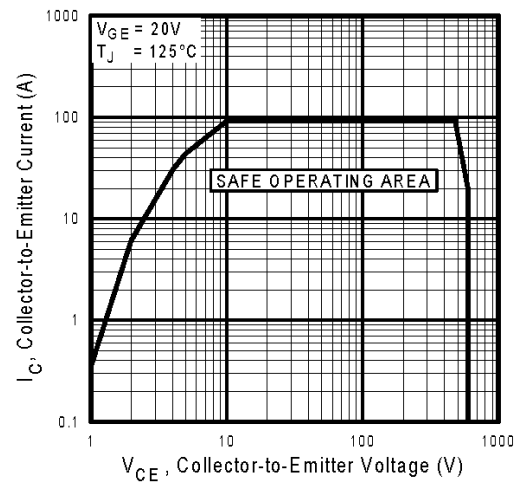


Fig. 12 - Turn-Off SOA

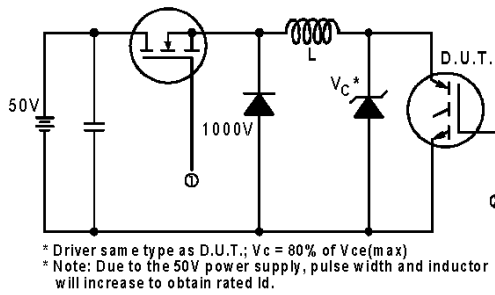


Fig. 13a - Clamped Inductive Load Test Circuit

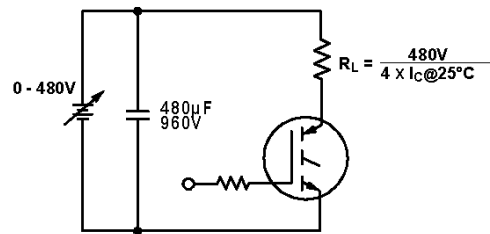


Fig. 13b - Pulsed Collector Current Test Circuit

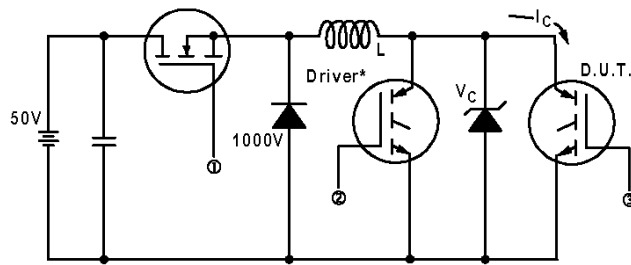


Fig. 14a - Switching Loss Test Circuit

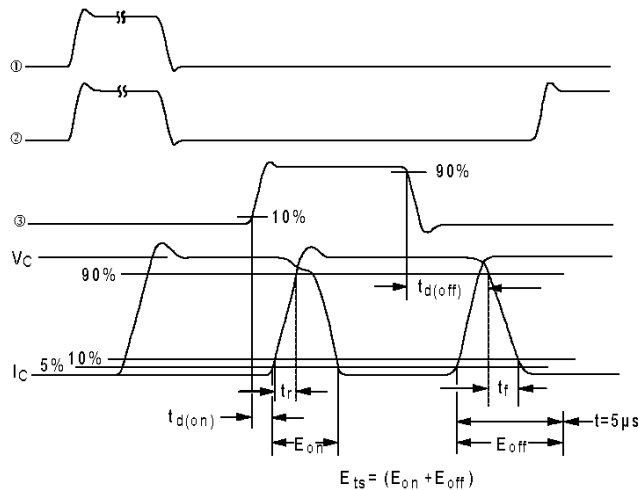


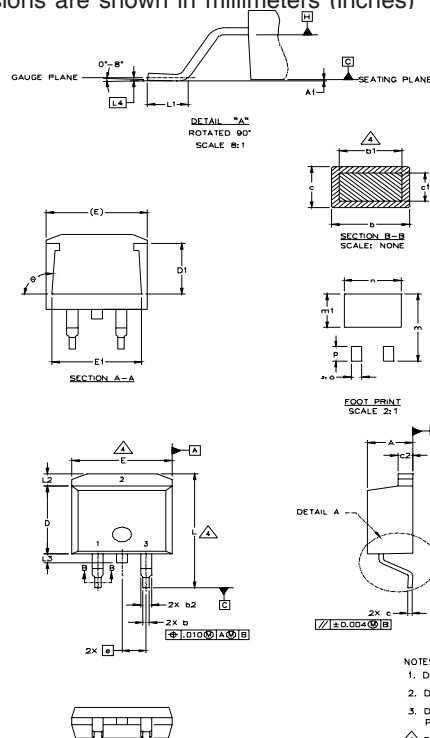
Fig. 14b - Switching Loss Waveforms

IRG4BC30U-SPbF

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D²Pak Package Outline

Dimensions are shown in millimeters (inches)



SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	4
A1		0.127		.005	
b	0.51	0.99	.020	.039	
b1	0.51	0.89	.020	.035	
b2	1.14	1.40	.045	.055	4
c	0.43	0.63	.017	.025	
c1	0.38	0.74	.015	.029	
c2	1.14	1.40	.045	.055	
D	8.51	9.65	.335	.380	3
D1	5.33		.210		3
E	9.65	10.67	.380	.420	
E1	6.22		.245		
e	2.54	BSC	.100	BSC	
L	14.61	15.88	.575	.625	
L1	1.78	2.79	.070	.110	
L2		1.65		.065	
L3	1.27	1.78	.050	.070	
L4	0.25	BSC	.010	BSC	
m	17.78		.700		
m1	8.89		.350		
n	11.43		.450		
o	2.08		.082		
p	3.81		.150		
θ	90°	93°	90°	93°	

LEAD ASSIGNMENTS

HEXFET	IGBTs, CoPACK	DIODES
1.- GATE	1.- GATE	1.- ANODE *
2.- DRAIN	2.- COLLECTOR	2.- CATHODE
3.- SOURCE	3.- EMITTER	3.- ANODE

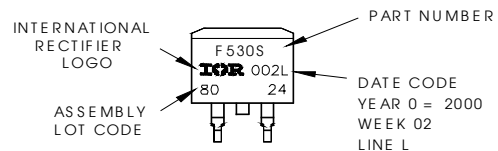
* PART DEPENDENT.

NOTES:
 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
 2. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
 3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 (.005") PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
 4. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
 5. CONTROLLING DIMENSION: INCH.

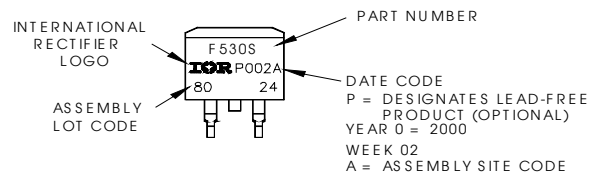
D²Pak Part Marking Information (Lead-Free)

EXAMPLE: THIS IS AN IRF530S WITH
 LOT CODE 8024
 ASSEMBLED ON WW 02, 2000
 IN THE ASSEMBLY LINE "L"

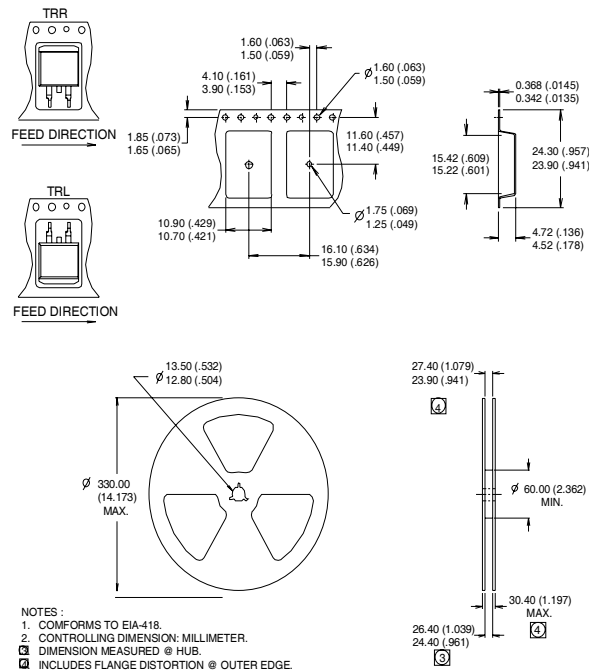
Note: "P" in assembly line
 position indicates "Lead-Free"



OR



D²Pak Tape & Reel Information



Data and specifications subject to change without notice.

International
IR Rectifier

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