

# ANTREX Electronics

Electronic Components Sourcing Information

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## Product Reference Information

**Part Number:** IRGB4610DPBF  
**Manufacturer:** Infineon Technologies  
**Package:** TO-220-3  
**Availability:** Please confirm with sales

**Product Page:**

<https://antrexco.com/product/details/infineon-technologies/irgb4610dpbf.html>

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## Contact Information

Email: [info@antrexco.com](mailto:info@antrexco.com)

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## Quality & Trust

New & Original Components

Supplier verification and packaging condition review

CoC / RoHS / REACH documents available on request

Secure sourcing support for OEM / EMS projects

**Note:**

This PDF includes an ANTREX product reference cover page.

The original manufacturer datasheet follows from the next page.

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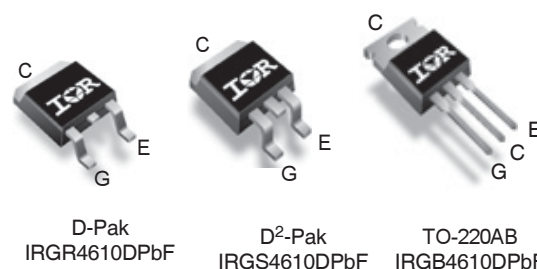
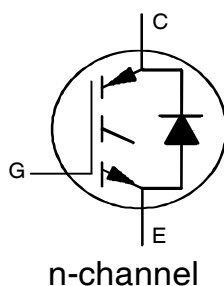
**Insulated Gate Bipolar Transistor with Ultrafast Soft Recovery Diode**

$$V_{CES} = 600V$$

$$I_C = 10A, T_C = 100^\circ C$$

$$t_{sc} > 5\mu s, T_{jmax} = 175^\circ C$$

$$V_{CE(on)} \text{ typ.} = 1.7V @ 6A$$



**Applications**

- Appliance Drives
- Inverters
- UPS

| G    | C         | E       |
|------|-----------|---------|
| Gate | Collector | Emitter |

| Features                                                                             | → | Benefits                                                                                  |
|--------------------------------------------------------------------------------------|---|-------------------------------------------------------------------------------------------|
| Low $V_{CE(ON)}$ and switching losses                                                |   | High efficiency in a wide range of applications and switching frequencies                 |
| Square RBSOA and maximum junction temperature $175^\circ C$                          |   | Improved reliability due to rugged hard switching performance and higher power capability |
| Positive $V_{CE(ON)}$ temperature coefficient and tighter distribution of parameters |   | Excellent current sharing in parallel operation                                           |
| $5\mu s$ short circuit SOA                                                           |   | Enables short circuit protection scheme                                                   |
| Lead-free, RoHS compliant                                                            |   | Environmentally friendly                                                                  |

| Base part number | Package Type | Standard Pack       |          | Orderable Part Number |
|------------------|--------------|---------------------|----------|-----------------------|
|                  |              | Form                | Quantity |                       |
| IRGR4610DPbF     | D-PAK        | Tube                | 75       | IRGR4610DPbF          |
|                  |              | Tape and Reel       | 2000     | IRGR4610DTRPbF        |
|                  |              | Tape and Reel Right | 3000     | IRGR4610DTRRPbF       |
|                  |              | Tape and Reel Left  | 3000     | IRGR4610DTRLRpF       |
| IRGS4610DPbF     | D² PAK       | Tube                | 50       | IRGS4610DPbF          |
|                  |              | Tape and Reel Right | 800      | IRGS4610DTRRPbF       |
|                  |              | Tape and Reel Left  | 800      | IRGS4610DTRLRpF       |
| IRGB4610DPbF     | TO-220AB     | Tube                | 50       | IRGB4610DPbF          |

**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                            | 16                  | A          |
| $I_C @ T_C = 100^\circ C$ | Continuous Collector Current                            | 10                  |            |
| $I_{CM}$                  | Pulsed Collector Current, $V_{GE} = 15V$                | 18                  |            |
| $I_{LM}$                  | Clamped Inductive Load Current, $V_{GE} = 20V$ ①        | 24                  |            |
| $I_F @ T_C = 25^\circ C$  | Diode Continuous Forward Current                        | 10                  |            |
| $I_F @ T_C = 100^\circ C$ | Diode Continuous Forward Current                        | 6                   | V          |
| $I_{FM}$                  | Diode Maximum Forward Current ④                         | 24                  |            |
| $V_{GE}$                  | Continuous Gate-to-Emitter Voltage                      | $\pm 20$            |            |
|                           | Transient Gate-to-Emitter Voltage                       | $\pm 30$            | W          |
| $P_D @ T_C = 25^\circ$    | Maximum Power Dissipation                               | 77                  |            |
| $P_D @ T_C = 100^\circ$   | Maximum Power Dissipation                               | 39                  | $^\circ C$ |
| $T_J$                     | Operating Junction and                                  | -40 to + 175        |            |
| $T_{STG}$                 | Storage Temperature Range                               |                     |            |
|                           | Soldering Temperature, for 10 seconds (1.6mm from case) | 300                 |            |
|                           | Mounting Torque, 6-32 or M3 Screw TO-220                | 10lbf. In (1.1 N.m) |            |

# Thermal Resistance

|                 | Parameter                                                                               | Min. | Typ. | Max. | Units |
|-----------------|-----------------------------------------------------------------------------------------|------|------|------|-------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case -(IGBT)②                                           | —    | —    | 1.9  | °C/W  |
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case -(Diode)②                                          | —    | —    | 6.3  |       |
| $R_{\theta CS}$ | Thermal Resistance, Case-to-Sink (flat, greased surface) (TO-220)                       | —    | 0.5  | —    |       |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient (PCB mount) (D-PAK)⑥                            | —    | —    | 50   |       |
|                 | Thermal Resistance, Junction-to-Ambient (D-PAK)                                         | —    | —    | 110  |       |
|                 | Thermal Resistance, Junction-to-Ambient (PCB mount, Steady State) (D <sup>2</sup> PAK)⑥ | —    | —    | 40   |       |
|                 | Thermal Resistance, Junction-to-Ambient ( Socket mount) (TO-220)                        | —    | —    | 62   |       |

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

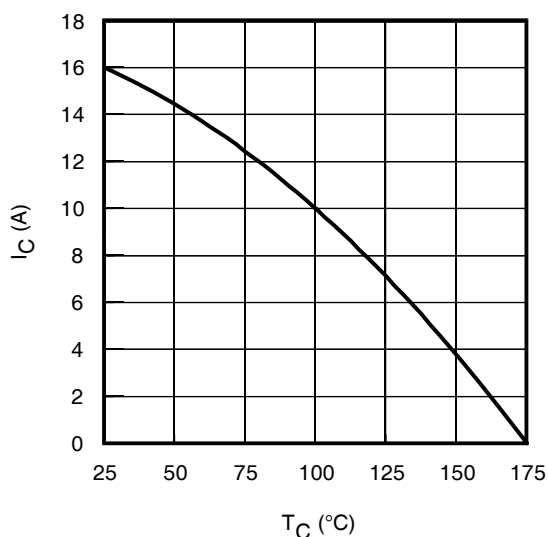
|                                 | Parameter                               | Min. | Typ. | Max. | Units   | Conditions                                              |
|---------------------------------|-----------------------------------------|------|------|------|---------|---------------------------------------------------------|
| $V_{(BR)CES}$                   | Collector-to-Emitter Breakdown Voltage  | 600  | —    | —    | V       | $V_{GE} = 0V, I_C = 100\mu A$ ③                         |
| $\Delta V_{(BR)CES}/\Delta T_J$ | Temperature Coeff. of Breakdown Voltage | —    | 0.36 | —    | V/°C    | $V_{GE} = 0V, I_C = 250\mu A$ ( 25 -175 °C )            |
| $V_{CE(on)}$                    | Collector-to-Emitter Saturation Voltage | —    | 1.7  | 2.0  | V       | $I_C = 6.0A, V_{GE} = 15V, T_J = 25^{\circ}\text{C}$    |
|                                 |                                         | —    | 2.07 | —    |         | $I_C = 6.0A, V_{GE} = 15V, T_J = 150^{\circ}\text{C}$   |
|                                 |                                         | —    | 2.14 | —    |         | $I_C = 6.0A, V_{GE} = 15V, T_J = 175^{\circ}\text{C}$   |
| $V_{GE(th)}$                    | Gate Threshold Voltage                  | 4.0  | —    | 6.5  | V       | $V_{CE} = V_{GE}, I_C = 150\mu A$                       |
| $\Delta V_{GE(th)}/\Delta T_J$  | Threshold Voltage temp. coefficient     | —    | -13  | —    | mV/°C   | $V_{CE} = V_{GE}, I_C = 250\mu A$ ( 25 -175 °C )        |
| $g_{fe}$                        | Forward Transconductance                | —    | 5.8  | —    | S       | $V_{CE} = 25V, I_C = 6.0A, PW = 80\mu S$                |
| $I_{CES}$                       | Collector-to-Emitter Leakage Current    | —    | —    | 25   | $\mu A$ | $V_{GE} = 0V, V_{CE} = 600V$                            |
|                                 |                                         | —    | —    | 250  |         | $V_{GE} = 0V, V_{CE} = 600V, T_J = 175^{\circ}\text{C}$ |
| $V_{FM}$                        | Diode Forward Voltage Drop              | —    | 1.60 | 2.30 | V       | $I_F = 6.0A$                                            |
|                                 |                                         | —    | 1.30 | —    |         | $I_F = 6.0A, T_J = 175^{\circ}\text{C}$                 |
| $I_{GES}$                       | Gate-to-Emitter Leakage Current         | —    | —    | ±100 | nA      | $V_{GE} = \pm 20V$                                      |

## Notes:

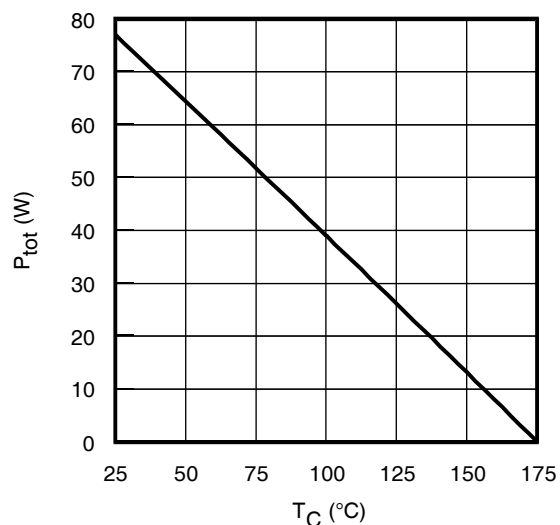
- ①  $V_{CC} = 80\% (V_{CES}), V_{GE} = 20V, L = 1.0mH, R_G = 100\Omega$ .
- ②  $R_{\theta}$  is measured at  $T_J$  approximately 90°C.
- ③ Refer to AN-1086 for guidelines for measuring  $V_{(BR)CES}$  safely.
- ④ Pulse width limited by max. junction temperature.
- ⑤ Values influenced by parasitic L and C in measurement
- ⑥ When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994: <http://www.irf.com/technical-info/appnotes/an-994.pdf>

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

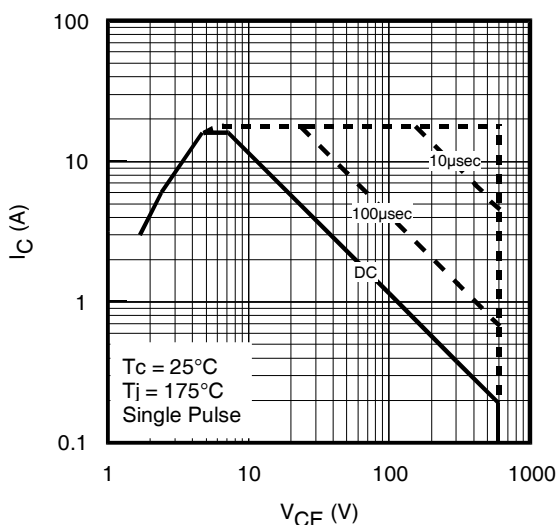
|              | Parameter                            | Min.        | Typ. | Max. | Units   | Conditions                                                                                                         |
|--------------|--------------------------------------|-------------|------|------|---------|--------------------------------------------------------------------------------------------------------------------|
| $Q_g$        | Total Gate Charge (turn-on)          | —           | 13   | —    | nC      | $I_C = 6.0A$                                                                                                       |
| $Q_{ge}$     | Gate-to-Emitter Charge (turn-on)     | —           | 3.0  | —    |         | $V_{CC} = 400V$                                                                                                    |
| $Q_{gc}$     | Gate-to-Collector Charge (turn-on)   | —           | 6.4  | —    |         | $V_{GE} = 15V$                                                                                                     |
| $E_{on}$     | Turn-On Switching Loss               | —           | 56   | —    | $\mu J$ | $I_C = 6.0A$ , $V_{CC} = 400V$ , $V_{GE} = 15V$                                                                    |
| $E_{off}$    | Turn-Off Switching Loss              | —           | 122  | —    |         | $R_G = 47\Omega$ , $L=1mH$ , $L_S= 150nH$ , $T_J = 25^\circ C$                                                     |
| $E_{total}$  | Total Switching Loss                 | —           | 178  | —    |         | Energy losses include tail and diode reverse recovery                                                              |
| $t_{d(on)}$  | Turn-On delay time                   | —           | 27   | —    | ns      | $I_C = 6.0A$ , $V_{CC} = 400V$                                                                                     |
| $t_r$        | Rise time                            | —           | 11   | —    |         | $R_G = 47\Omega$ , $L=1mH$ , $L_S= 150nH$                                                                          |
| $t_{d(off)}$ | Turn-Off delay time                  | —           | 75   | —    |         | $T_J = 25^\circ C$ ⑤                                                                                               |
| $t_f$        | Fall time                            | —           | 17   | —    |         |                                                                                                                    |
| $E_{on}$     | Turn-On Switching Loss               | —           | 140  | —    | $\mu J$ | $I_C = 6.0A$ , $V_{CC} = 400V$ , $V_{GE} = 15V$                                                                    |
| $E_{off}$    | Turn-Off Switching Loss              | —           | 189  | —    |         | $R_G = 47\Omega$ , $L=1mH$ , $L_S= 150nH$ , $T_J = 175^\circ C$                                                    |
| $E_{total}$  | Total Switching Loss                 | —           | 329  | —    |         | Energy losses include tail and diode reverse recovery                                                              |
| $t_{d(on)}$  | Turn-On delay time                   | —           | 26   | —    | ns      | $I_C = 6.0A$ , $V_{CC} = 400V$                                                                                     |
| $t_r$        | Rise time                            | —           | 12   | —    |         | $R_G = 47\Omega$ , $L=1mH$ , $L_S= 150nH$                                                                          |
| $t_{d(off)}$ | Turn-Off delay time                  | —           | 95   | —    |         | $T_J = 175^\circ C$ ⑤                                                                                              |
| $t_f$        | Fall time                            | —           | 32   | —    |         |                                                                                                                    |
| $C_{ies}$    | Input Capacitance                    | —           | 350  | —    | pF      | $V_{GE} = 0V$                                                                                                      |
| $C_{oes}$    | Output Capacitance                   | —           | 29   | —    |         | $V_{CC} = 30V$                                                                                                     |
| $C_{res}$    | Reverse Transfer Capacitance         | —           | 10   | —    |         | $f = 1Mhz$                                                                                                         |
| RBSOA        | Reverse Bias Safe Operating Area     | FULL SQUARE |      |      |         | $T_J = 175^\circ C$ , $I_C = 24A$<br>$V_{CC} = 500V$ , $V_p = 600V$<br>$R_G = 100\Omega$ , $V_{GE} = +20V$ to $0V$ |
| SCSOA        | Short Circuit Safe Operating Area    | 5           | —    | —    | $\mu s$ | $V_{CC} = 400V$ , $V_p = 600V$<br>$R_G = 100\Omega$ , $V_{GE} = +15V$ to $0V$                                      |
| Erec         | Reverse recovery energy of the diode | —           | 178  | —    | $\mu J$ | $T_J = 175^\circ C$                                                                                                |
| trr          | Diode Reverse recovery time          | —           | 74   | —    | ns      | $V_{CC} = 400V$ , $I_F = 6.0A$                                                                                     |
| Irr          | Peak Reverse Recovery Current        | —           | 12   | —    | A       | $V_{GE} = 15V$ , $R_g = 47\Omega$ , $L=1mH$ , $L_S=150nH$                                                          |



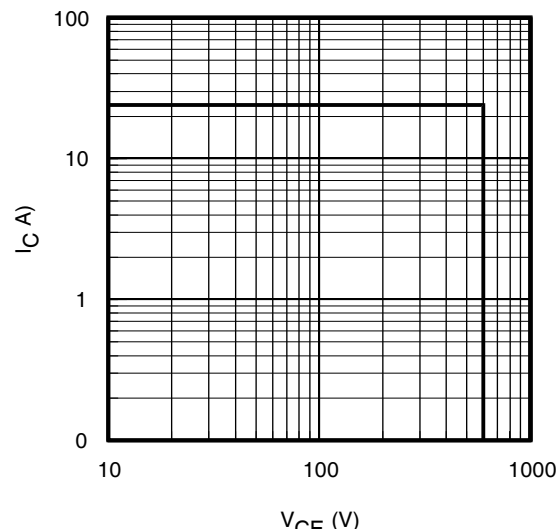
**Fig. 1** - Maximum DC Collector Current vs. Case Temperature



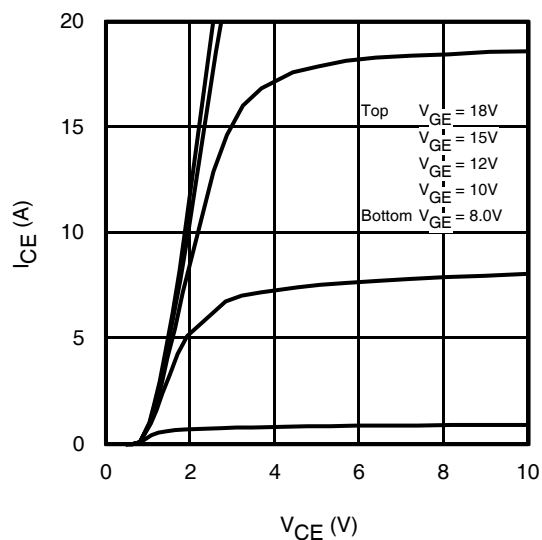
**Fig. 2** - Power Dissipation vs. Case Temperature



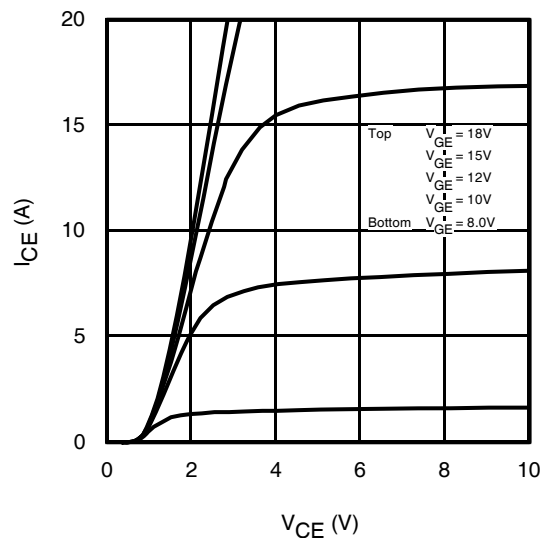
**Fig. 3** - Forward SOA,  
 $T_C = 25^\circ\text{C}$ ,  $T_J \leq 175^\circ\text{C}$ ,  $V_{GE} = 15\text{V}$



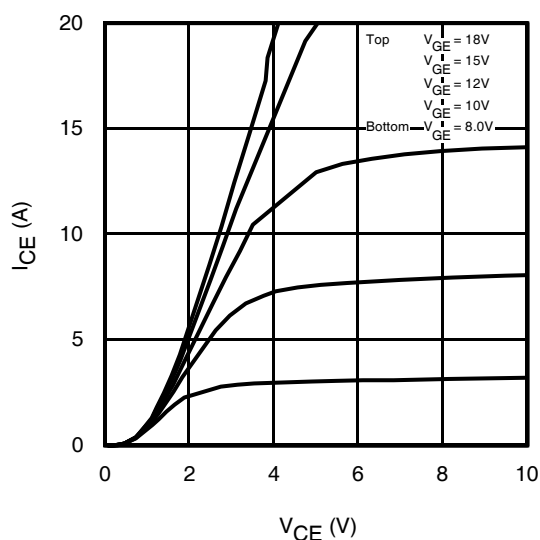
**Fig. 4** - Reverse Bias SOA  
 $T_J = 175^\circ\text{C}$ ,  $V_{GE} = 20\text{V}$



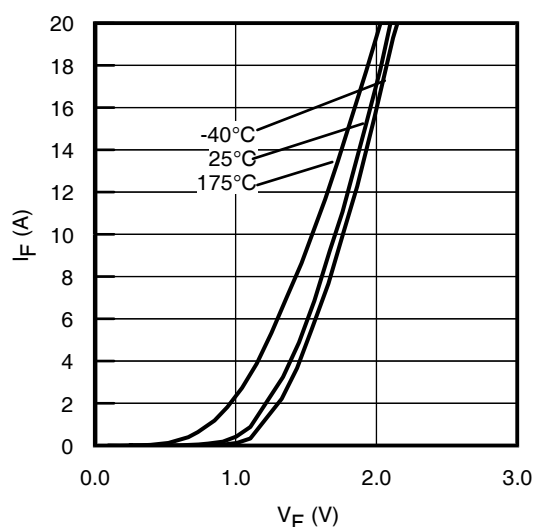
**Fig. 5** - Typ. IGBT Output Characteristics  
 $T_J = -40^\circ\text{C}$ ;  $t_p = 80\mu\text{s}$



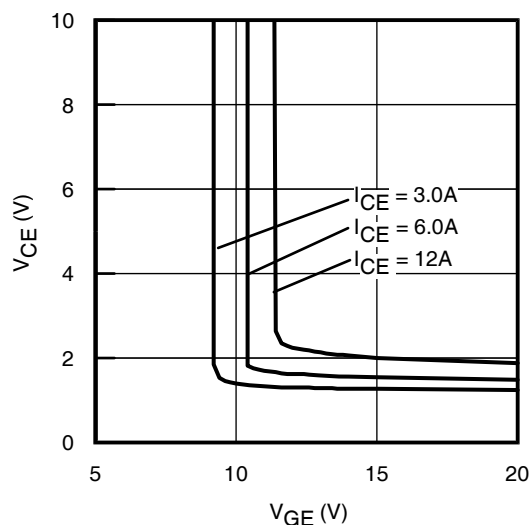
**Fig. 6** - Typ. IGBT Output Characteristics  
 $T_J = 25^\circ\text{C}$ ;  $t_p = 80\mu\text{s}$



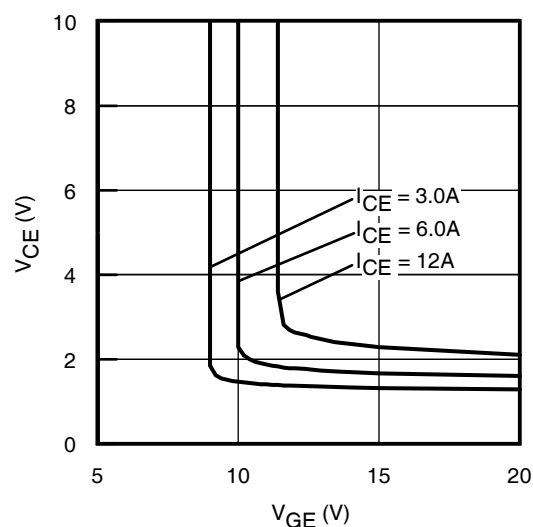
**Fig. 7 - Typ. IGBT Output Characteristics**  
 $T_J = 175^\circ\text{C}$ ;  $t_p = 80\mu\text{s}$



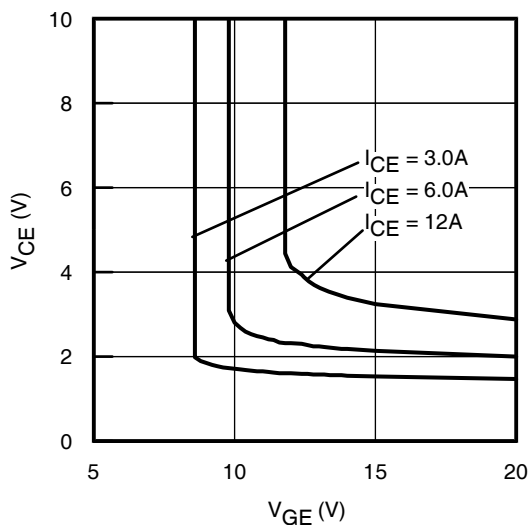
**Fig. 8 - Typ. Diode Forward Characteristics**  
 $t_p = 80\mu\text{s}$



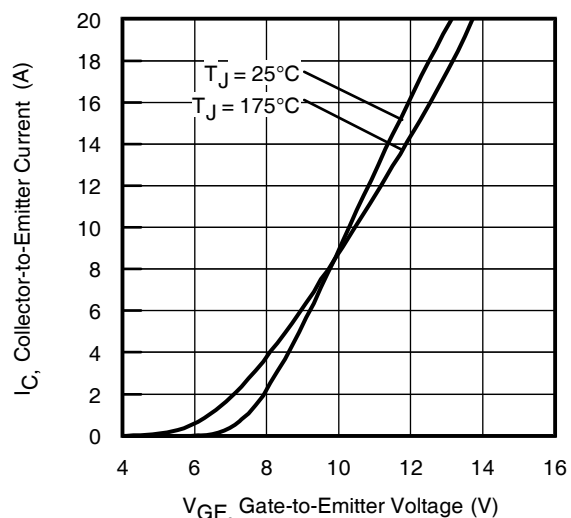
**Fig. 9 - Typical  $V_{CE}$  vs.  $V_{GE}$**   
 $T_J = -40^\circ\text{C}$



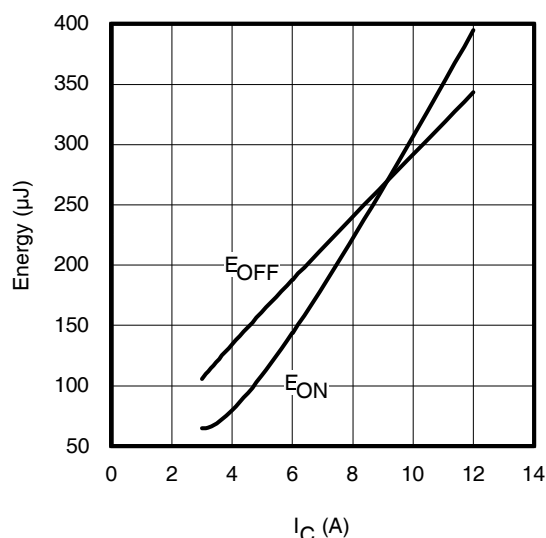
**Fig. 10 - Typical  $V_{CE}$  vs.  $V_{GE}$**   
 $T_J = 25^\circ\text{C}$



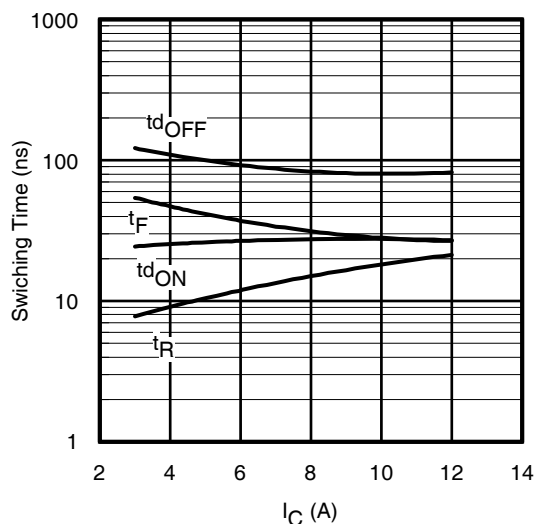
**Fig. 11 - Typical  $V_{CE}$  vs.  $V_{GE}$**   
 $T_J = 175^\circ\text{C}$



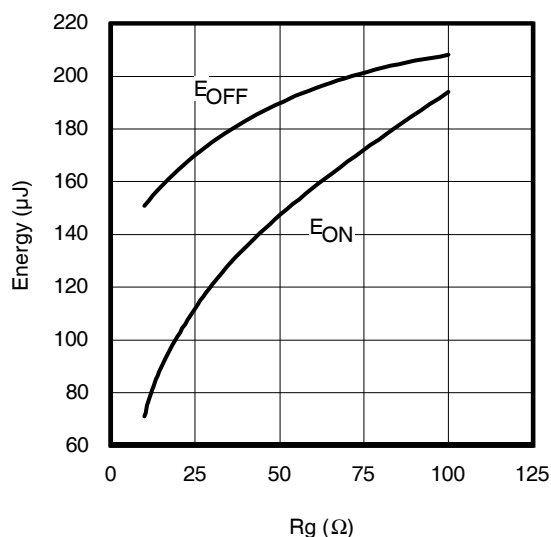
**Fig. 12 - Typ. Transfer Characteristics**  
 $V_{CE} = 50\text{V}$ ;  $t_p = 10\mu\text{s}$



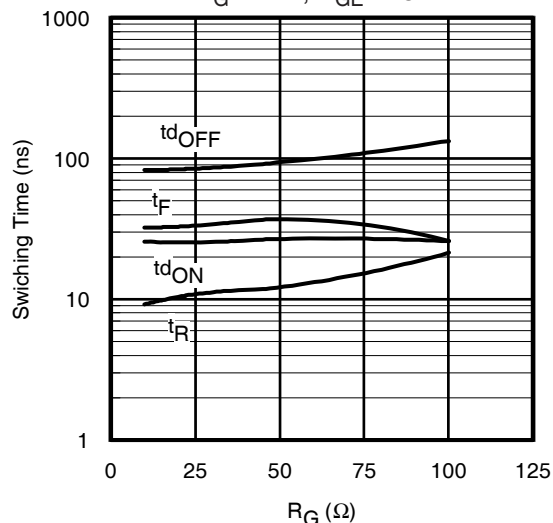
**Fig. 13** - Typ. Energy Loss vs.  $I_C$   
 $T_J = 175^\circ\text{C}$ ;  $L = 1\text{mH}$ ;  $V_{CE} = 400\text{V}$ ;  $R_G = 47\Omega$ ;  $V_{GE} = 15\text{V}$ .



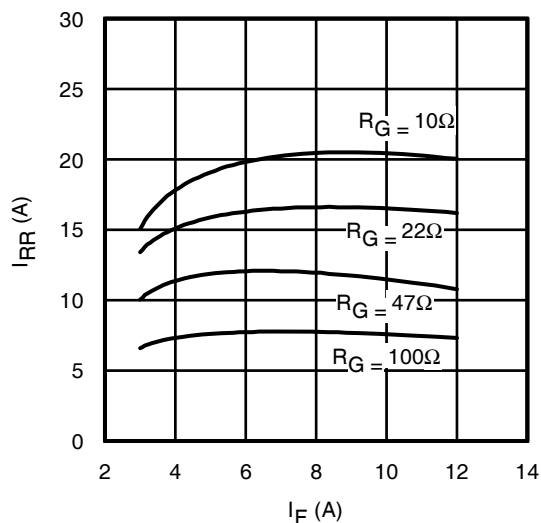
**Fig. 14** - Typ. Switching Time vs.  $I_C$   
 $T_J = 175^\circ\text{C}$ ;  $L = 1\text{mH}$ ;  $V_{CE} = 400\text{V}$   
 $R_G = 47\Omega$ ;  $V_{GE} = 15\text{V}$



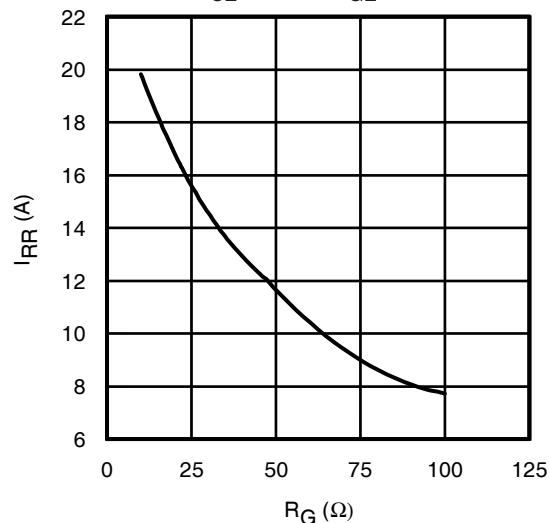
**Fig. 15** - Typ. Energy Loss vs.  $R_G$   
 $T_J = 175^\circ\text{C}$ ;  $L = 1\text{mH}$ ;  $V_{CE} = 400\text{V}$ ;  $I_{CE} = 6.0\text{A}$ ;  $V_{GE} = 15\text{V}$



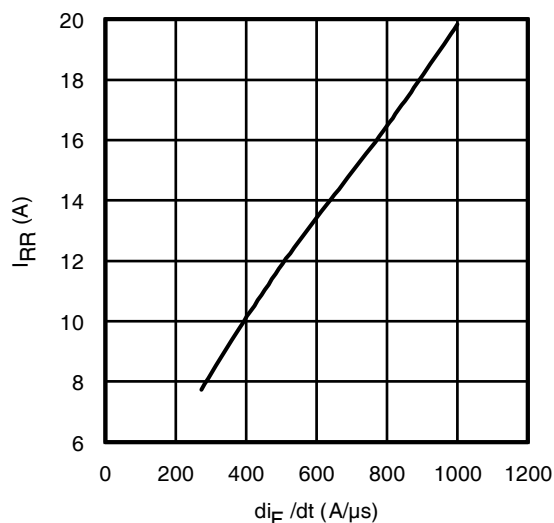
**Fig. 16** - Typ. Switching Time vs.  $R_G$   
 $T_J = 175^\circ\text{C}$ ;  $L = 1\text{mH}$ ;  $V_{CE} = 400\text{V}$   
 $I_{CE} = 6.0\text{A}$ ;  $V_{GE} = 15\text{V}$



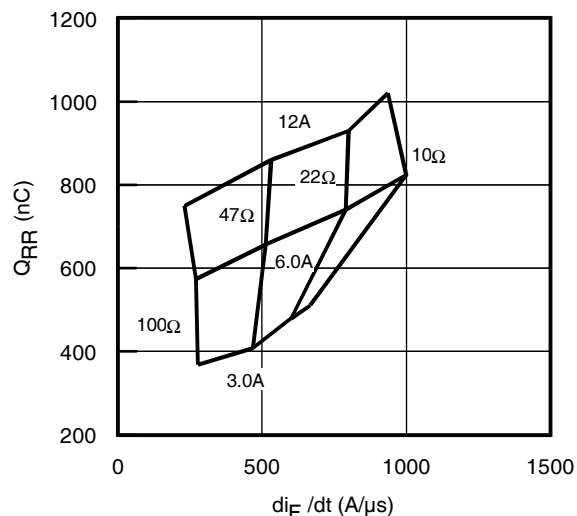
**Fig. 17** - Typical Diode  $I_{RR}$  vs.  $I_F$   
 $T_J = 175^\circ\text{C}$



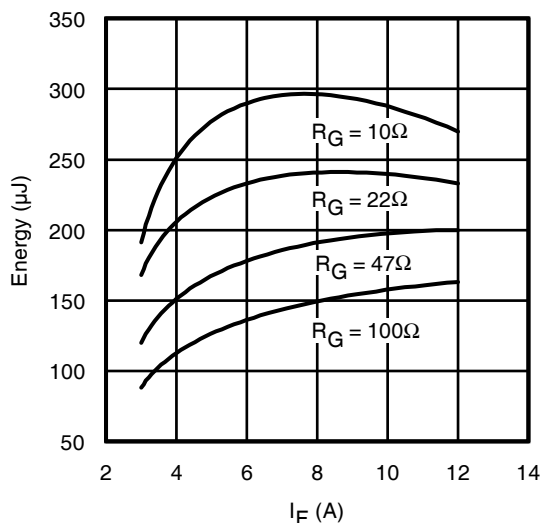
**Fig. 18** - Typical Diode  $I_{RR}$  vs.  $R_G$   
 $T_J = 175^\circ\text{C}$ ;  $I_F = 6.0\text{A}$



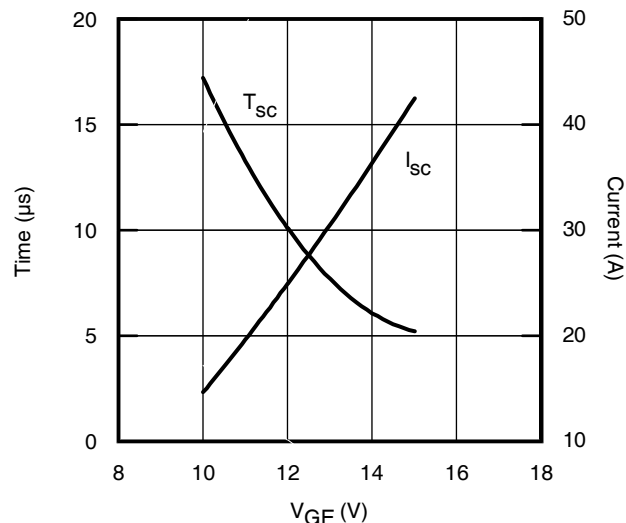
**Fig. 19- Typical Diode  $I_{RR}$  vs.  $di_F/dt$**   
 $V_{CC}=400V$ ;  $V_{GE}=15V$ ;  
 $I_{CE}=6.0A$ ;  $T_J=175^\circ C$



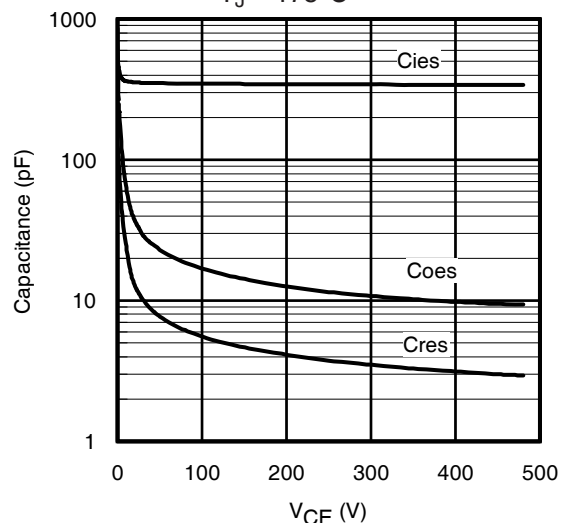
**Fig. 20 - Typical Diode  $Q_{RR}$**   
 $V_{CC}=400V$ ;  $V_{GE}=15V$ ;  $T_J=175^\circ C$



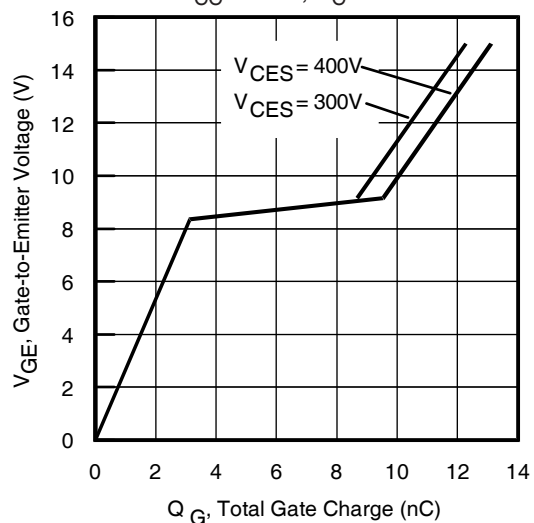
**Fig. 21 - Typical Diode  $E_{RR}$  vs.  $I_F$**   
 $T_J=175^\circ C$



**Fig. 22- Typ.  $V_{GE}$  vs. Short Circuit Time**  
 $V_{CC}=400V$ ,  $T_C=25^\circ C$



**Fig. 23- Typ. Capacitance vs.  $V_{CE}$**   
 $V_{GE}=0V$ ;  $f=1MHz$



**Fig. 24 - Typical Gate Charge vs.  $V_{GE}$**   
 $I_{CE}=6.0A$ ,  $L=600\mu H$

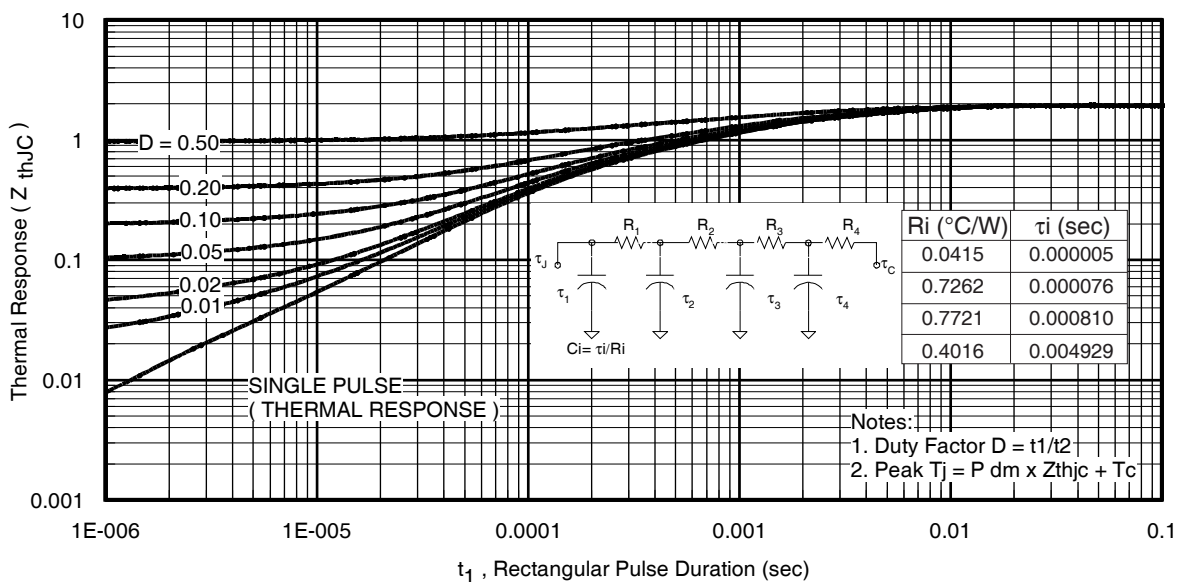


Fig 25. Maximum Transient Thermal Impedance, Junction-to-Case (IGBT)

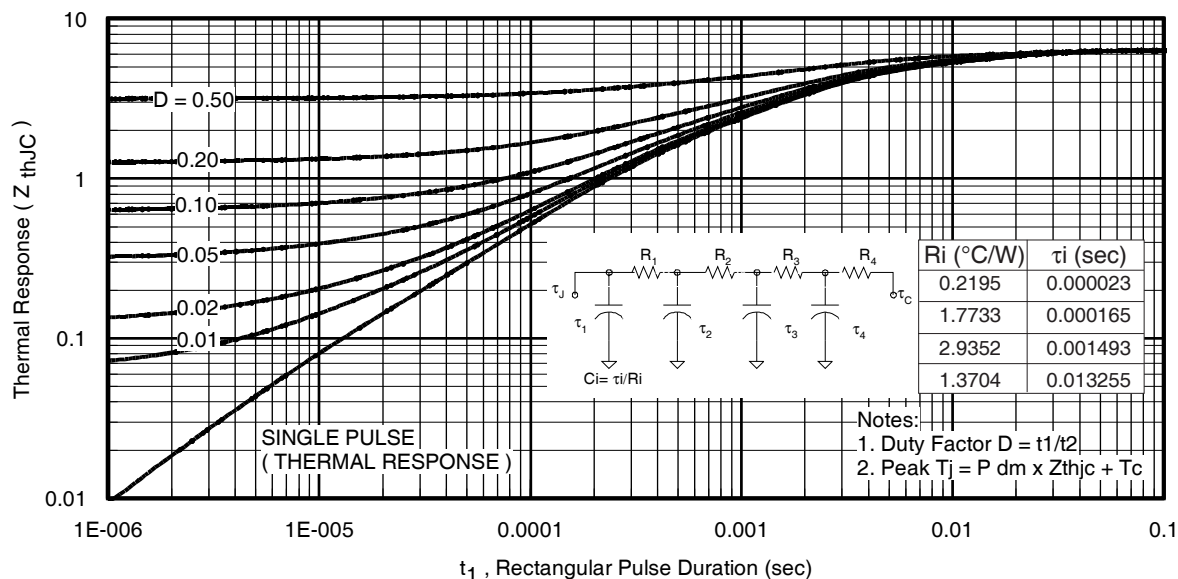


Fig. 26. Maximum Transient Thermal Impedance, Junction-to-Case (DIODE)

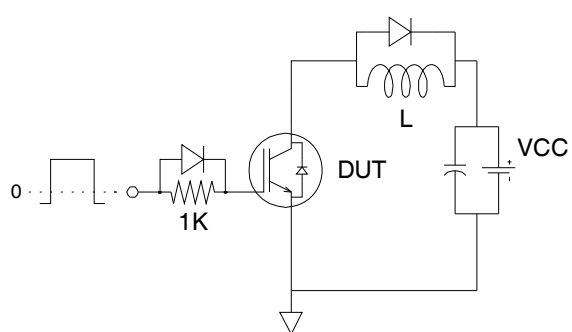


Fig.C.T.1 - Gate Charge Circuit (turn-off)

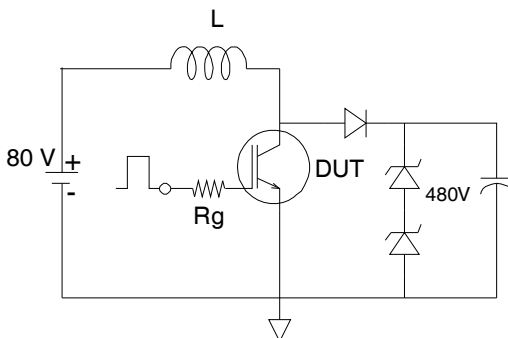


Fig.C.T.2 - RBSOA Circuit

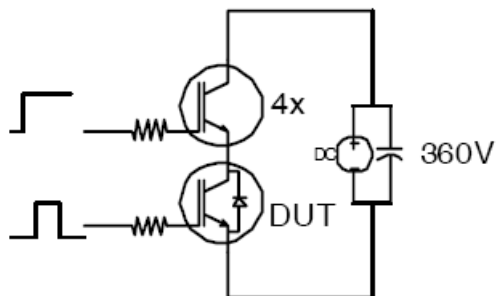


Fig.C.T.3 - S.C.SOA Circuit

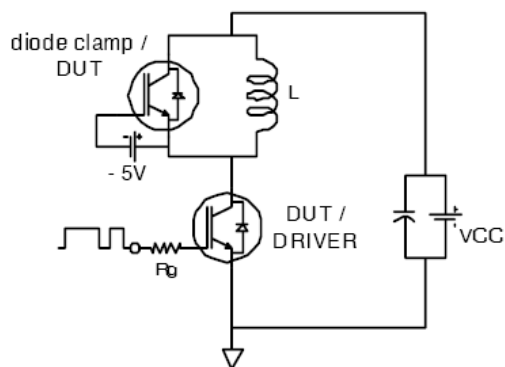


Fig.C.T.4 - Switching Loss Circuit

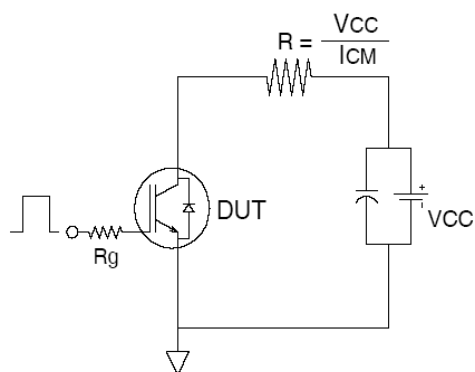
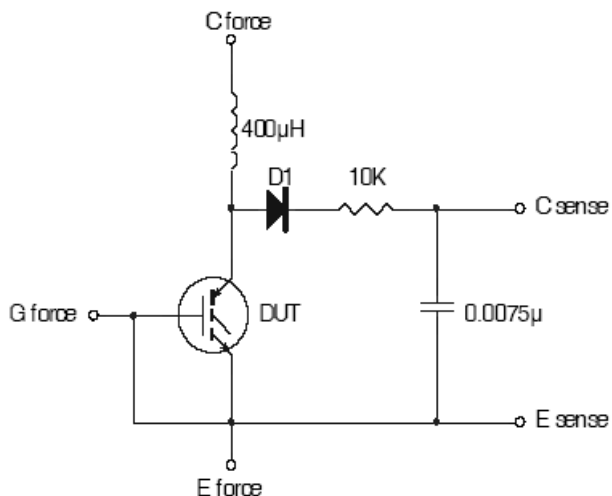
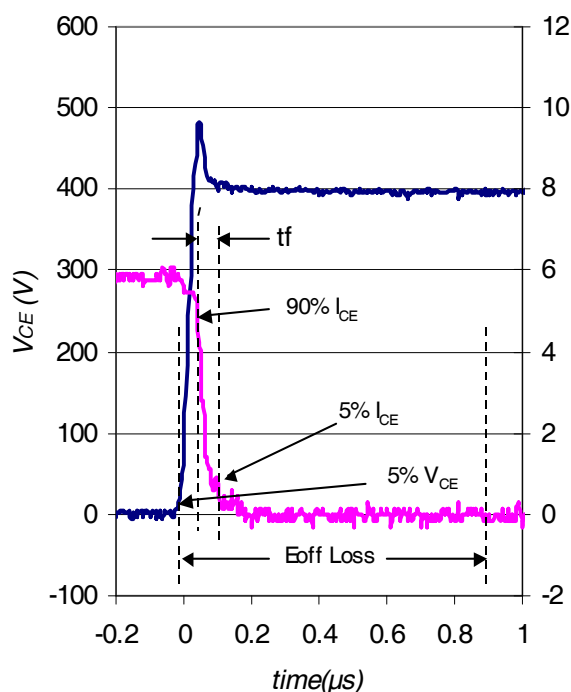
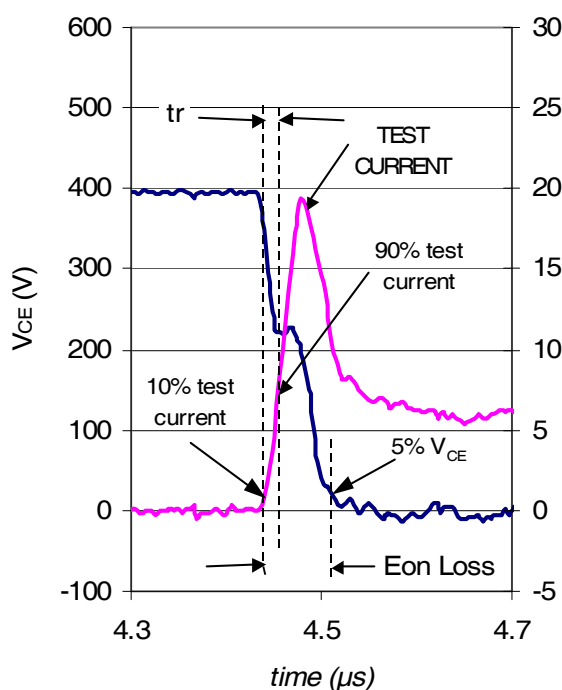


Fig.C.T.5 - Resistive Load Circuit

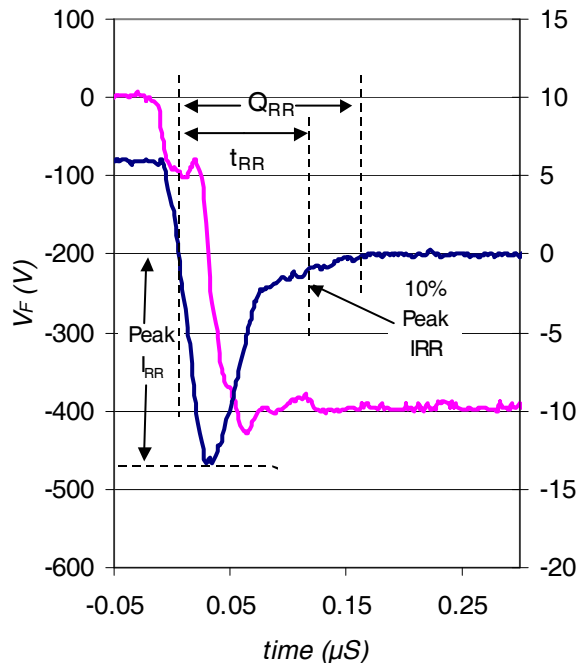

Fig.C.T.6 - Typical Filter Circuit for  $V_{(BR)CES}$  Measurement



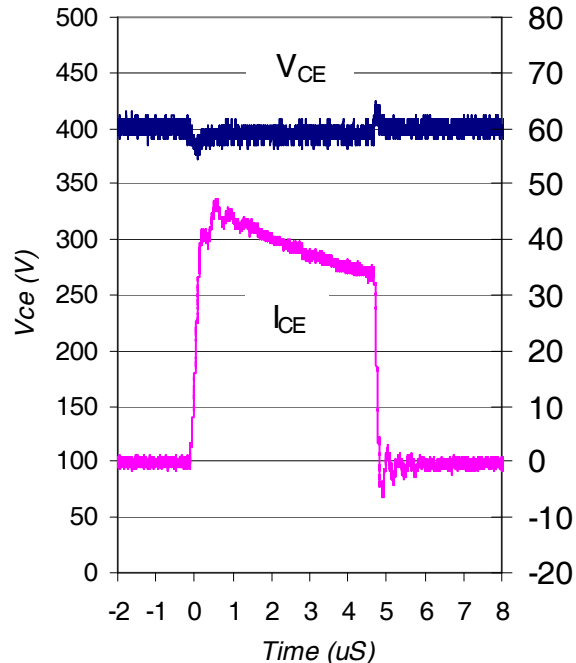
**Fig. WF1** - Typ. Turn-off Loss Waveform  
@  $T_J = 175^\circ\text{C}$  using Fig. CT.4



**Fig. WF2** - Typ. Turn-on Loss Waveform  
@  $T_J = 175^\circ\text{C}$  using Fig. CT.4



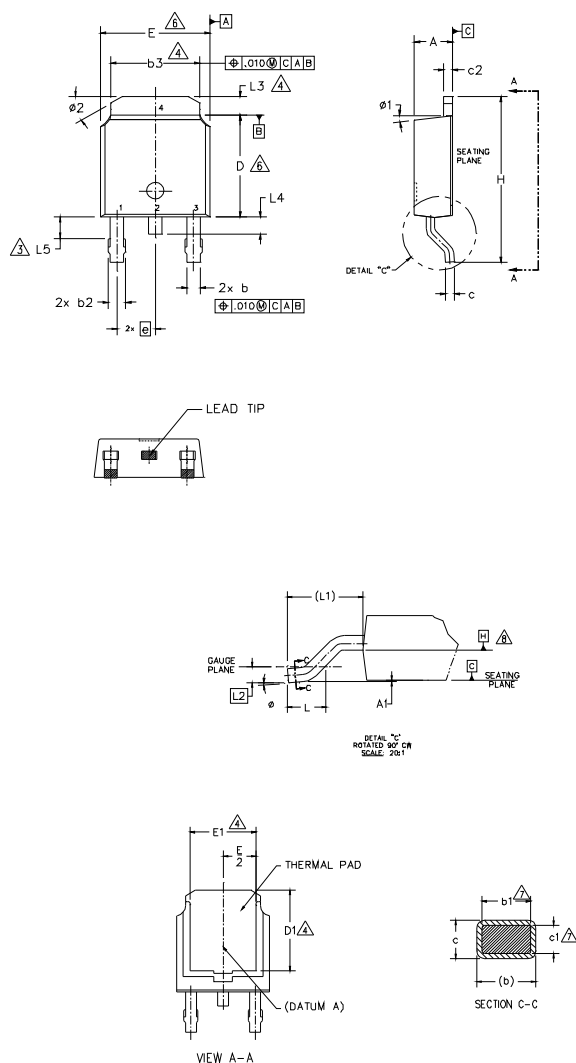
**WF.3-** Typ. Diode Recovery Waveform  
@  $T_J = 175^\circ\text{C}$  using CT.4



**WF.4-** Typ. Short Circuit Waveform  
@  $T_J = 25^\circ\text{C}$  using CT.3

## D-Pak (TO-252AA) Package Outline

Dimensions are shown in millimeters (inches)



### NOTES:

- 1.- DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
- 2.- DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS]
- 3.- LEAD DIMENSION UNCONTROLLED IN L5.
- 4.- DIMENSION D1, E1, L3 & b3 ESTABLISH A MINIMUM MOUNTING SURFACE FOR THERMAL PAD.
- 5.- SECTION C-C DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN .005 AND 0.10 [0.13 AND 0.25] FROM THE LEAD TIP.
- 6.- DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005 [0.13] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
- 7.- DIMENSION b1 & c1 APPLIED TO BASE METAL ONLY.
- 8.- DATUM A & B TO BE DETERMINED AT DATUM PLANE H.
- 9.- OUTLINE CONFORMS TO JEDEC OUTLINE TO-252AA.

| SYMBOL | DIMENSIONS  |       |           |      | NOTES |
|--------|-------------|-------|-----------|------|-------|
|        | MILLIMETERS |       | INCHES    |      |       |
|        | MIN.        | MAX.  | MIN.      | MAX. |       |
| A      | 2.18        | 2.39  | .086      | .094 |       |
| A1     | —           | 0.13  | —         | .005 |       |
| b      | 0.64        | 0.89  | .025      | .035 |       |
| b1     | 0.65        | 0.79  | .025      | .031 | 7     |
| b2     | 0.76        | 1.14  | .030      | .045 |       |
| b3     | 4.95        | 5.46  | .195      | .215 | 4     |
| c      | 0.46        | 0.61  | .018      | .024 |       |
| c1     | 0.41        | 0.56  | .016      | .022 | 7     |
| c2     | 0.46        | 0.89  | .018      | .035 |       |
| D      | 5.97        | 6.22  | .235      | .245 | 6     |
| D1     | 5.21        | —     | .205      | —    | 4     |
| E      | 6.35        | 6.73  | .250      | .265 | 6     |
| E1     | 4.32        | —     | .170      | —    | 4     |
| e      | 2.29 BSC    |       | .090 BSC  |      |       |
| H      | 9.40        | 10.41 | .370      | .410 |       |
| L      | 1.40        | 1.78  | .055      | .070 |       |
| L1     | 2.74 BSC    |       | .108 REF. |      |       |
| L2     | 0.51 BSC    |       | .020 BSC  |      |       |
| L3     | 0.89        | 1.27  | .035      | .050 | 4     |
| L4     | —           | 1.02  | —         | .040 |       |
| L5     | 1.14        | 1.52  | .045      | .060 | 3     |
| ø      | 0"          | 10"   | 0"        | 10"  |       |
| ø1     | 0"          | 15"   | 0"        | 15"  |       |
| ø2     | 25"         | 35"   | 25"       | 35"  |       |

### LEAD ASSIGNMENTS

### HEXFET

- 1.- GATE
- 2.- DRAIN
- 3.- SOURCE
- 4.- DRAIN

### IGBT & CoPAK

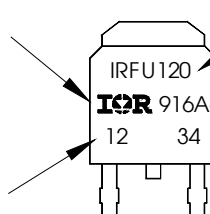
- 1.- GATE
- 2.- COLLECTOR
- 3.- EMITTER
- 4.- COLLECTOR

## D-Pak (TO-252AA) Part Marking Information

EXAMPLE: THIS IS AN IRFR120  
WITH ASSEMBLY  
LOT CODE 1234  
ASSEMBLED ON WW 16, 1999  
IN THE ASSEMBLY LINE "A"

INTERNATIONAL  
RECTIFIER  
LOGO

ASSEMBLY  
LOT CODE

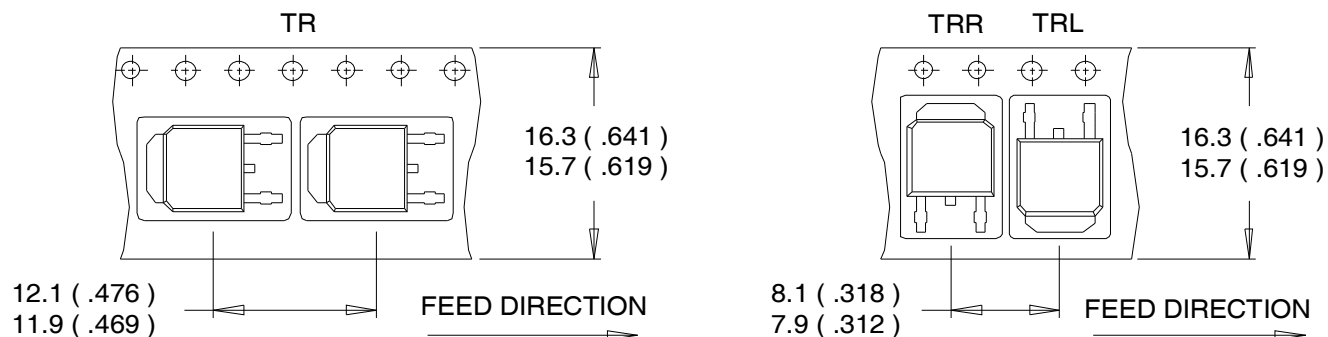


PART NUMBER

DATE CODE  
YEAR 9 = 1999  
WEEK 16  
LINE A

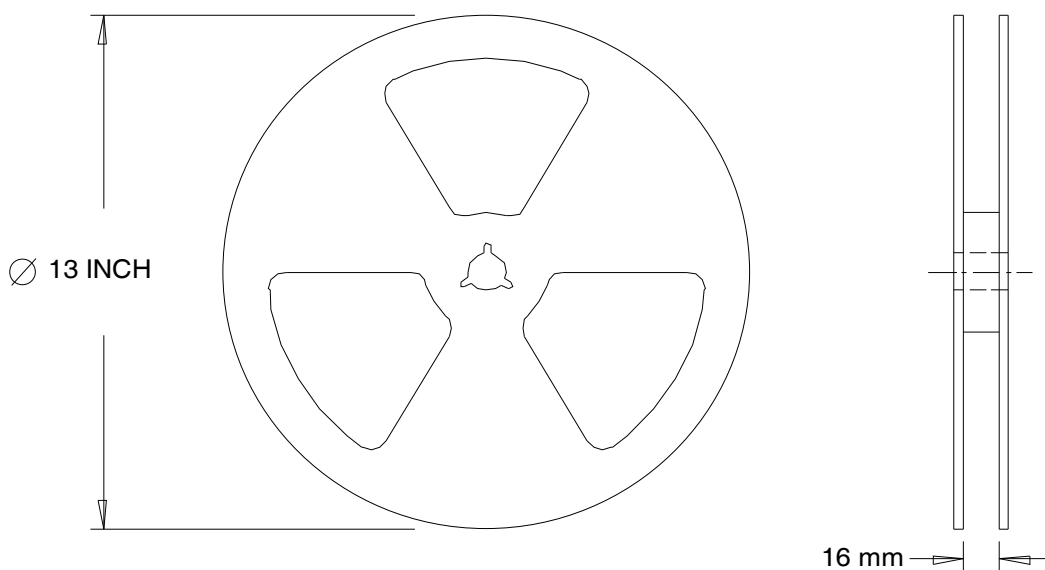
Note: For the most current drawing please refer to IR website at <http://www.irf.com/package/>

# D-Pak (TO-252AA) Tape & Reel Information (Dimensions are shown in millimeters (inches))



## NOTES :

1. CONTROLLING DIMENSION : MILLIMETER.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS ( INCHES ).
3. OUTLINE CONFORMS TO EIA-481 & EIA-541.



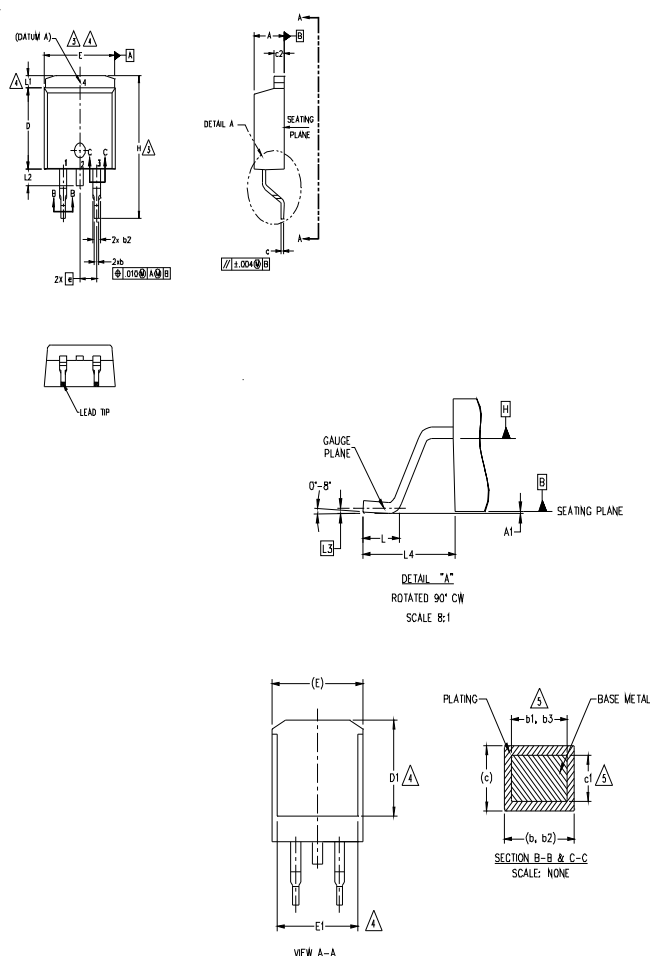
## NOTES :

1. OUTLINE CONFORMS TO EIA-481.

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

## D<sup>2</sup>Pak Package Outline

Dimensions are shown in millimeters (inches)



| S<br>Y<br>M<br>B<br>O<br>L | DIMENSIONS  |       |          |      | N<br>O<br>T<br>E<br>S |
|----------------------------|-------------|-------|----------|------|-----------------------|
|                            | MILLIMETERS |       | INCHES   |      |                       |
|                            | MIN.        | MAX.  | MIN.     | MAX. |                       |
| A                          | 4.06        | 4.83  | .160     | .190 |                       |
| A1                         | 0.00        | 0.254 | .000     | .010 |                       |
| b                          | 0.51        | 0.99  | .020     | .039 |                       |
| b1                         | 0.51        | 0.89  | .020     | .035 |                       |
| b2                         | 1.14        | 1.78  | .045     | .070 | 5                     |
| b3                         | 1.14        | 1.73  | .045     | .068 | 5                     |
| c                          | 0.38        | 0.74  | .015     | .029 |                       |
| c1                         | 0.38        | 0.58  | .015     | .023 |                       |
| c2                         | 1.14        | 1.65  | .045     | .065 |                       |
| D                          | 8.38        | 9.65  | .330     | .380 |                       |
| D1                         | 6.86        | —     | .270     |      | 3                     |
| E                          | 9.65        | 10.67 | .380     | .420 | 4                     |
| E1                         | 6.22        | —     | .245     |      | 3,4                   |
| e                          | 2.54 BSC    |       | .100 BSC |      | 4                     |
| H                          | 14.61       | 15.88 | .575     | .625 |                       |
| L                          | 1.78        | 2.79  | .070     | .110 |                       |
| L1                         | —           | 1.65  | —        | .066 |                       |
| L2                         | —           | 1.78  | —        | .070 |                       |
| L3                         | 0.25 BSC    |       | .010 BSC |      | 4                     |
| L4                         | 4.78        | 5.28  | .188     | .208 |                       |

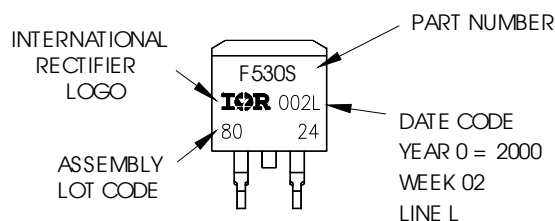
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES]
3. DIMENSIONS D & E DO NOT INCLUDE WELD FLASH. WELD FLASH SHALL NOT EXCEED 0.127 [0.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY AT DATUM H.
4. THERMAL PAD CONTACT OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.
5. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
6. DATUM A & B TO BE DETERMINED AT DATUM PLANE H.
7. CONTROLLING DIMENSION: INCH.
8. OUTLINE CONFORMS TO JEDEC OUTLINE TO-263AB

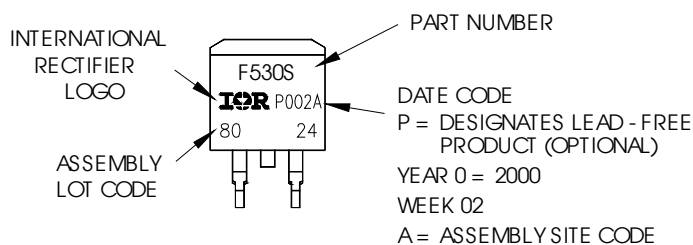
## D<sup>2</sup>Pak Part Marking Information

EXAMPLE: THIS IS AN IRF530S WITH  
LOT CODE 8024  
ASSEMBLED ON WW02, 2000  
IN THE ASSEMBLY LINE "L"

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

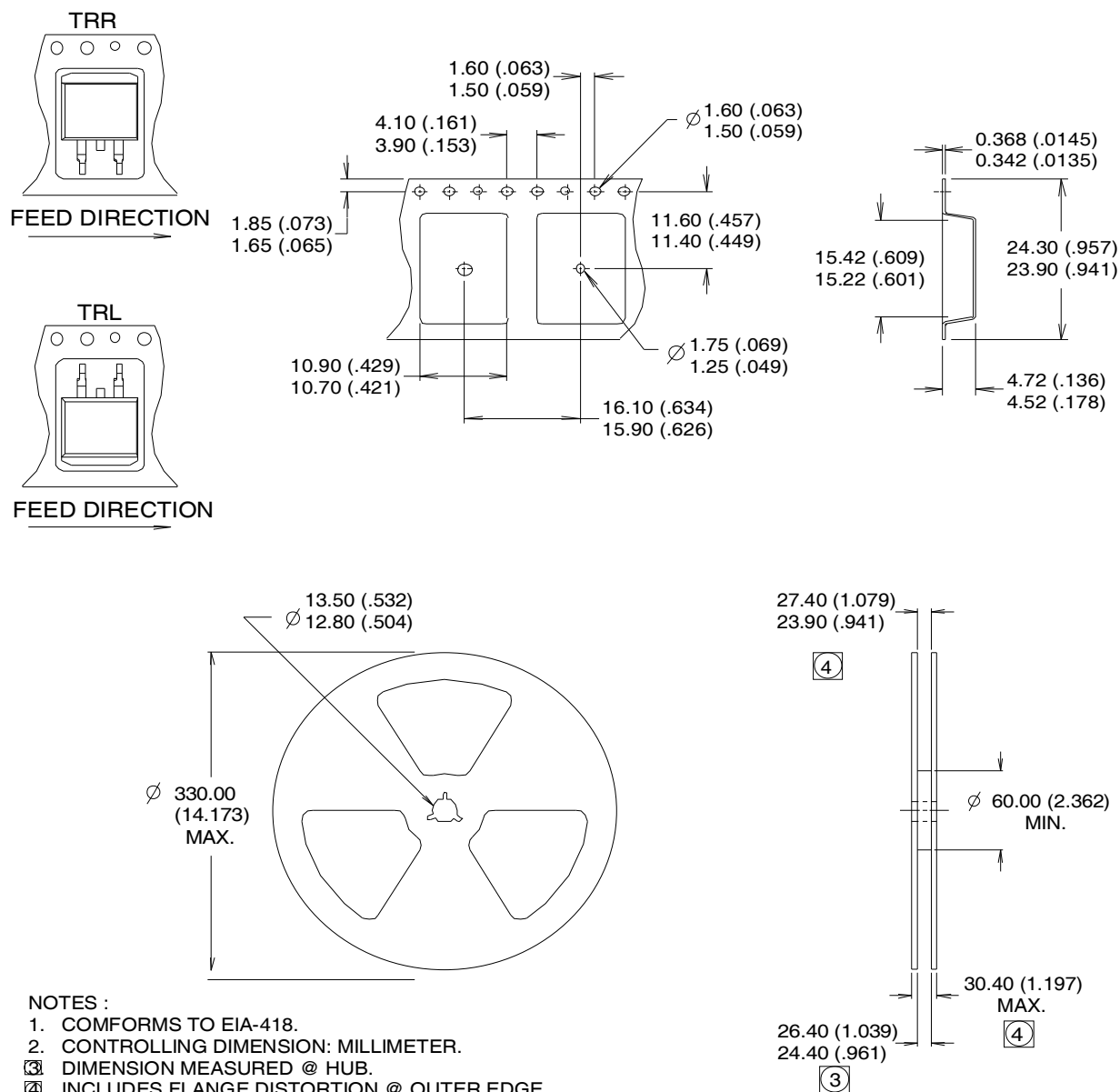


OR



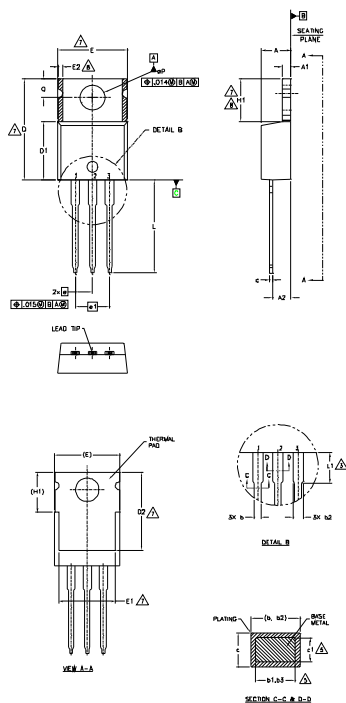
**Note:** For the most current drawing please refer to IR website at <http://www.irf.com/package/>

## D<sup>2</sup>Pak Tape & Reel Information (Dimensions are shown in millimeters (inches))



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

# TO-220AB Package Outline (Dimensions are shown in millimeters (inches))



## NOTES:

- 1.- DIMENSIONING AND TOLERANCING AS PER ASME Y14.5 M- 1994.
- 2.- DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS].
- 3.- LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.
- 4.- DIMENSION D, D1 & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
- 5.- DIMENSION b1, b3 & c1 APPLY TO BASE METAL ONLY.
- 6.- CONTROLLING DIMENSION : INCHES.
- 7.- THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS E,H1,D2 & E1
- 8.- DIMENSION E2 X H1 DEFINE A ZONE WHERE STAMPING AND SINGULATION IRREGULARITIES ARE ALLOWED.
- 9.- OUTLINE CONFORMS TO JEDEC TO-220, EXCEPT A2 (max.) AND D2 (min.) WHERE DIMENSIONS ARE DERIVED FROM THE ACTUAL PACKAGE OUTLINE.

| SYMBOL | DIMENSIONS  |       |          |      | NOTES |
|--------|-------------|-------|----------|------|-------|
|        | MILLIMETERS |       | INCHES   |      |       |
|        | MIN.        | MAX.  | MIN.     | MAX. |       |
| A      | 3.56        | 4.83  | .140     | .190 |       |
| A1     | 1.14        | 1.40  | .045     | .055 |       |
| A2     | 2.03        | 2.92  | .080     | .115 |       |
| b      | 0.38        | 1.01  | .015     | .040 |       |
| b1     | 0.38        | 0.97  | .015     | .038 | 5     |
| b2     | 1.14        | 1.78  | .045     | .070 |       |
| b3     | 1.14        | 1.73  | .045     | .068 | 5     |
| c      | 0.36        | 0.61  | .014     | .024 |       |
| c1     | 0.36        | 0.56  | .014     | .022 | 5     |
| D      | 14.22       | 16.51 | .560     | .650 | 4     |
| D1     | 8.38        | 9.02  | .330     | .355 |       |
| D2     | 11.68       | 12.88 | .460     | .507 | 7     |
| E      | 9.65        | 10.67 | .380     | .420 | 4,7   |
| E1     | 6.86        | 8.89  | .270     | .350 | 7     |
| E2     | —           | 0.76  | —        | .030 | 8     |
| e      | 2.54 BSC    |       | .100 BSC |      |       |
| e1     | 5.08 BSC    |       | .200 BSC |      |       |
| H1     | 5.84        | 6.86  | .230     | .270 | 7,8   |
| L      | 12.70       | 14.73 | .500     | .580 |       |
| L1     | 3.56        | 4.06  | .140     | .160 | 3     |
| ØP     | 3.54        | 4.08  | .139     | .161 |       |
| Q      | 2.54        | 3.42  | .100     | .135 |       |

## LEAD ASSIGNMENTS

- HEXCEL  
1.- GATE  
2.- DRAIN  
3.- SOURCE

## GR15, CAPACK

- 1.- GATE  
2.- COLLECTOR  
3.- EMITTER

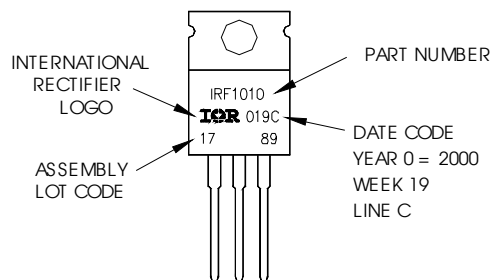
## DIODES

- 1.- ANODE  
2.- CATHODE  
3.- ANODE

# TO-220AB Part Marking Information

EXAMPLE: THIS IS AN IRF1010  
LOT CODE 1789  
ASSEMBLED ON WW 19, 2000  
IN THE ASSEMBLY LINE "C"

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



TO-220AB packages are not recommended for Surface Mount Application.

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

# Qualification Information<sup>†</sup>

|                                   |                                                 |      |
|-----------------------------------|-------------------------------------------------|------|
| <b>Qualification Level</b>        | Industrial<br>(per JEDEC JESD47F) <sup>††</sup> |      |
| <b>Moisture Sensitivity Level</b> | D-Pak                                           | MSL1 |
|                                   | D <sup>2</sup> Pak                              |      |
|                                   | TO-220                                          | N/A  |
| <b>RoHS Compliant</b>             | Yes                                             |      |

<sup>†</sup> Qualification standards can be found at International Rectifier's web site: <http://www.irf.com/product-info/reliability>

<sup>††</sup> Applicable version of JEDEC standard at the time of product release

# Revision History

| Date       | Comments                                                                                                                                                                                                                                     |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11/14/2014 | <ul style="list-style-type: none"> <li>Added note ④ to I<sub>FM</sub> Diode Maximum Forward Current on page 1.</li> <li>Removed note ④ to switching losses test condition on page 3.</li> <li>Updated package outline on page 15.</li> </ul> |