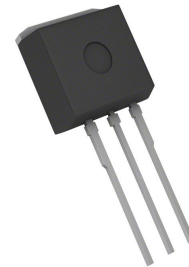
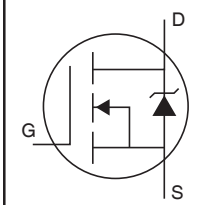


Features

- Advanced Process Technology
- Low On-Resistance
- 175°C Operating Temperature
- Fast Switching
- Repetitive Avalanche Allowed up to Tjmax
- Lead-Free, RoHS Compliant
- Automotive Qualified *

 D²Pak
AUIRFS3607

 TO-262
AUIRFSL3607


	V_{DSS}	75V
	$R_{DS(on)}$ typ.	7.34mΩ
		max.
I_D	80A	

Absolute Maximum Ratings

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only; and functional operation of the device at these or any other condition beyond those indicated in the specifications is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions. Ambient temperature (T_A) is 25°C, unless otherwise specified.

	Parameter	Max.	Units
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	80	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	56	
I_{DM}	Pulsed Drain Current ①	310	
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	140	W
	Linear Derating Factor	0.96	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
dv/dt	Peak Diode Recovery ③	27	V/ns
E_{AS} (Thermally limited)	Single Pulse Avalanche Energy ②	120	mJ
I_{AR}	Avalanche Current ①	46	A
E_{AR}	Repetitive Avalanche Energy ④	14	mJ
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C
	Soldering Temperature, for 10 seconds	300(1.6mm from case)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ⑤	—	1.045	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount) , D ² Pak ⑦	—	40	

Static Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

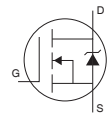
	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source Breakdown Voltage	75	—	—	V	V _{GS} = 0V, I _D = 250μA
ΔV _{(BR)DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient	—	0.096	—	V/°C	Reference to 25°C, I _D = 5mA ^②
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	7.34	9.0	mΩ	V _{GS} = 10V, I _D = 46A ^④
V _{GS(th)}	Gate Threshold Voltage	2.0	—	4.0	V	V _{DS} = V _{GS} , I _D = 100μA
g _{fs}	Forward Transconductance	115	—	—	S	V _{DS} = 50V, I _D = 46A
I _{DSS}	Drain-to-Source Leakage Current	—	—	20	μA	V _{DS} = 75V, V _{GS} = 0V
		—	—	250		V _{DS} = 60V, V _{GS} = 0V, T _J = 125°C
I _{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	V _{GS} = 20V
	Gate-to-Source Reverse Leakage	—	—	-100		V _{GS} = -20V

Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
Q _g	Total Gate Charge	—	56	84	nC	I _D = 46A V _{DS} = 38V V _{GS} = 10V ^④
Q _{gs}	Gate-to-Source Charge	—	13	—		
Q _{gd}	Gate-to-Drain ("Miller") Charge	—	16	—		
Q _{sync}	Total Gate Charge Sync. (Q _g - Q _{gd})	—	40	—		
R _{G(int)}	Internal Gate Resistance	—	0.55	—	Ω	
t _{d(on)}	Turn-On Delay Time	—	16	—	ns	V _{DD} = 49V I _D = 46A R _G = 6.8Ω V _{GS} = 10V ^④
t _r	Rise Time	—	110	—		
t _{d(off)}	Turn-Off Delay Time	—	43	—		
t _f	Fall Time	—	96	—		
C _{iss}	Input Capacitance	—	3070	—	pF	V _{GS} = 0V V _{DS} = 50V f = 1.0MHz
C _{oss}	Output Capacitance	—	280	—		
C _{rss}	Reverse Transfer Capacitance	—	130	—		
C _{oss eff. (ER)}	Effective Output Capacitance (Energy Related)	—	380	—		
C _{oss eff. (TR)}	Effective Output Capacitance (Time Related)	—	610	—		

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	80	A	MOSFET symbol showing the integral reverse p-n junction diode.
I _{SM}	Pulsed Source Current (Body Diode) ^②	—	—	310		
V _{SD}	Diode Forward Voltage	—	—	1.3	V	T _J = 25°C, I _S = 46A, V _{GS} = 0V ^④
t _{rr}	Reverse Recovery Time	—	33	50	ns	T _J = 25°C V _R = 64V,
		—	39	59		T _J = 125°C I _F = 46A
Q _{rr}	Reverse Recovery Charge	—	32	48	nC	T _J = 25°C di/dt = 100A/μs ^④
		—	47	71		T _J = 125°C
I _{RRM}	Reverse Recovery Current	—	1.9	—	A	T _J = 25°C
t _{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				



Qualification Information[†]

Qualification Level		Automotive (per AEC-Q101) ^{††}	
		Comments: This part number(s) passed Automotive qualification. IR's Industrial and Consumer qualification level is granted by extension of the higher Automotive level.	
Moisture Sensitivity Level		3L-D2 PAK	MSL1
		3L-TO-262	N/A
ESD	Machine Model	Class M4(+/- 600V) ^{†††} AEC-Q101-002	
	Human Body Model	Class H1C(+/- 2000V) ^{†††} AEC-Q101-001	
	Charged Device Model	Class C5(+/- 2000V) ^{†††} AEC-Q101-005	
RoHS Compliant		Yes	

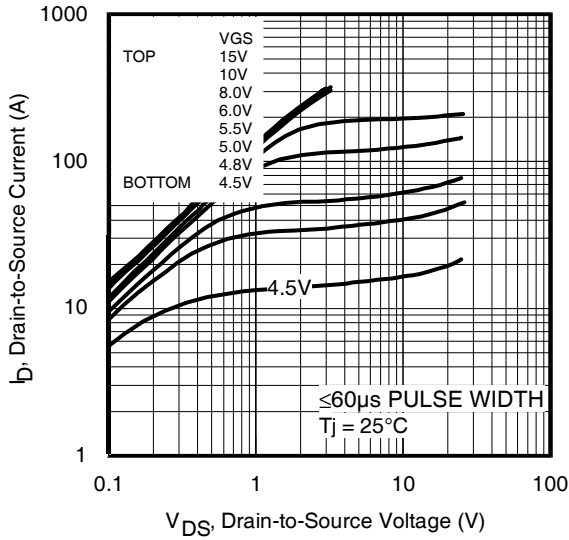


Fig 1. Typical Output Characteristics

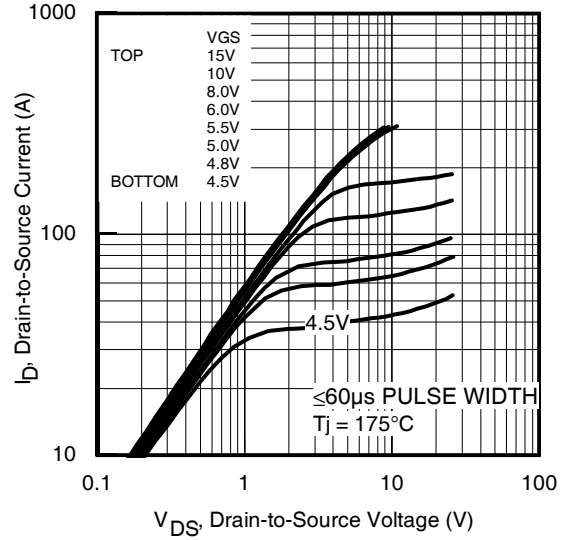


Fig 2. Typical Output Characteristics

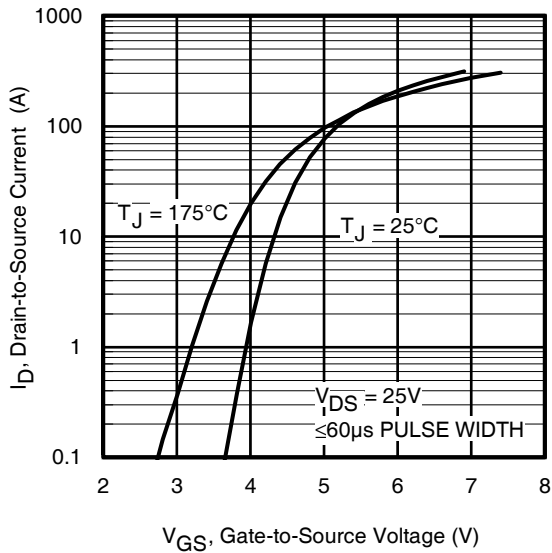


Fig 3. Typical Transfer Characteristics

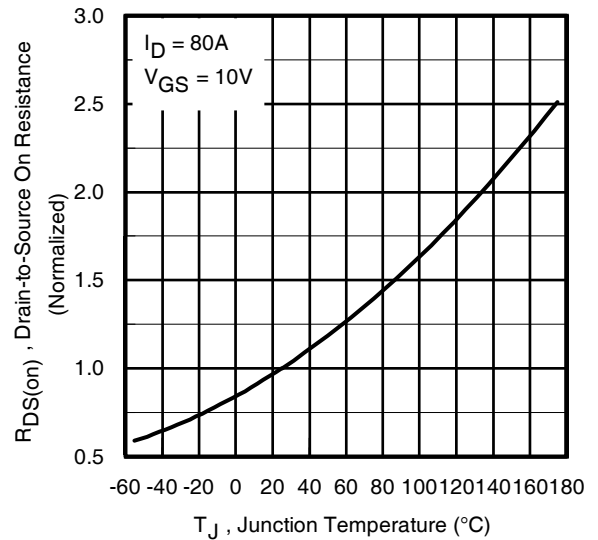


Fig 4. Normalized On-Resistance vs. Temperature

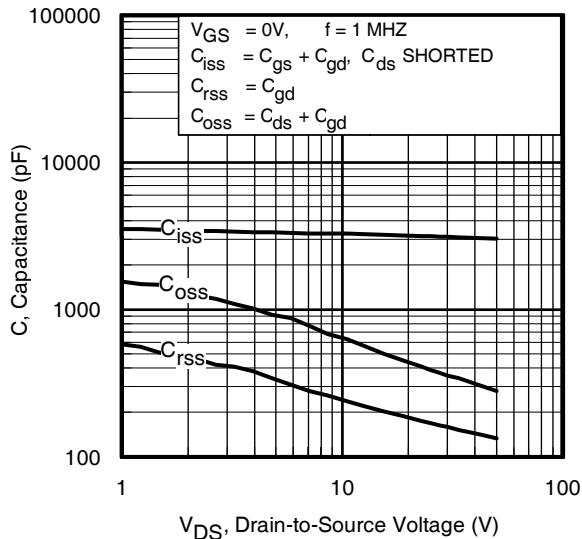


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

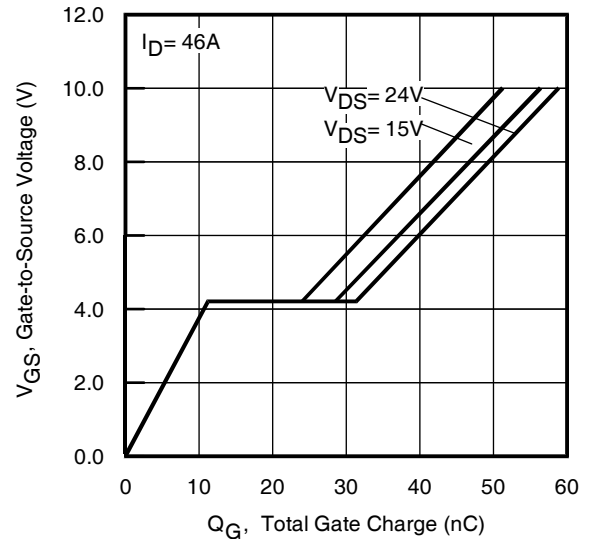


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

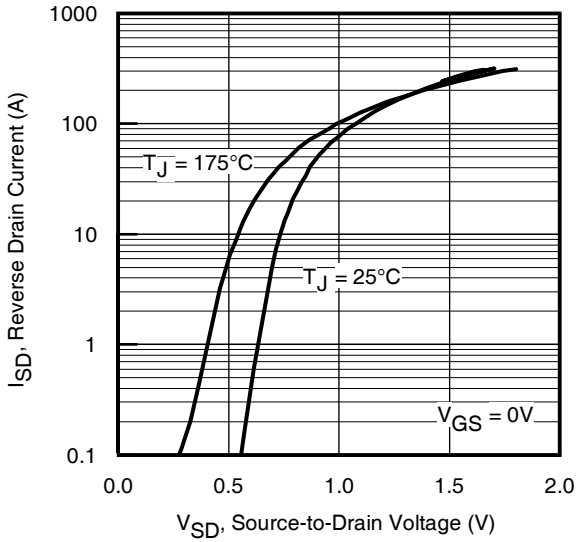


Fig 7. Typical Source-Drain Diode Forward Voltage

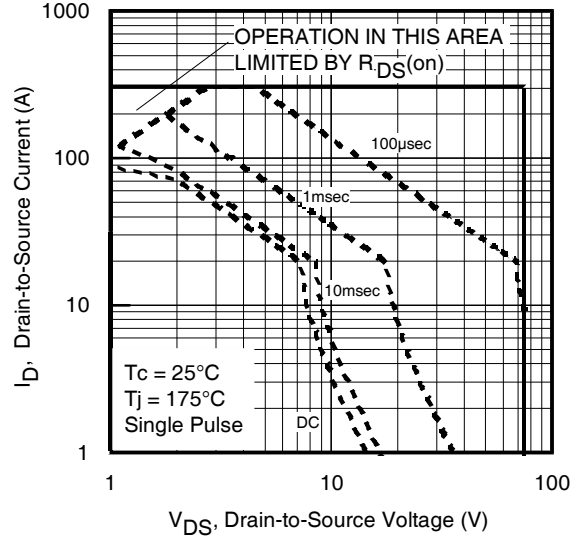


Fig 8. Maximum Safe Operating Area

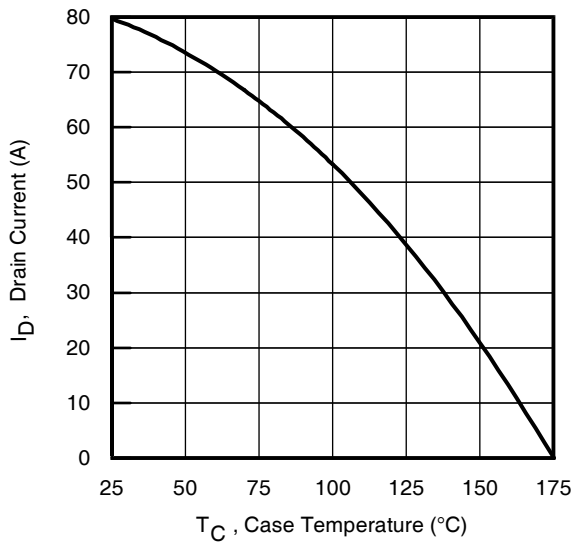


Fig 9. Maximum Drain Current vs. Case Temperature

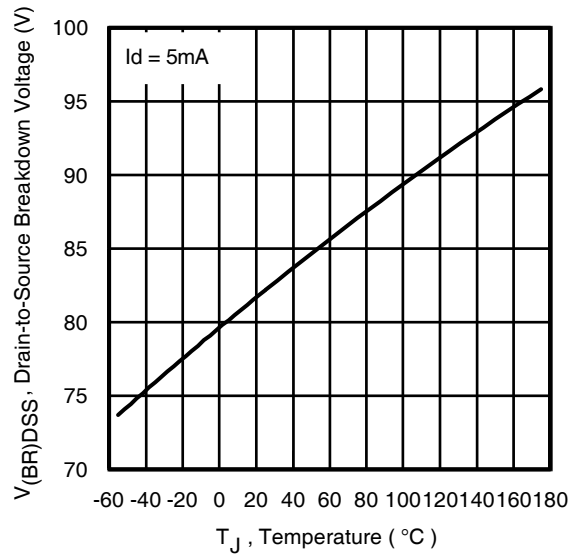


Fig 10. Drain-to-Source Breakdown Voltage

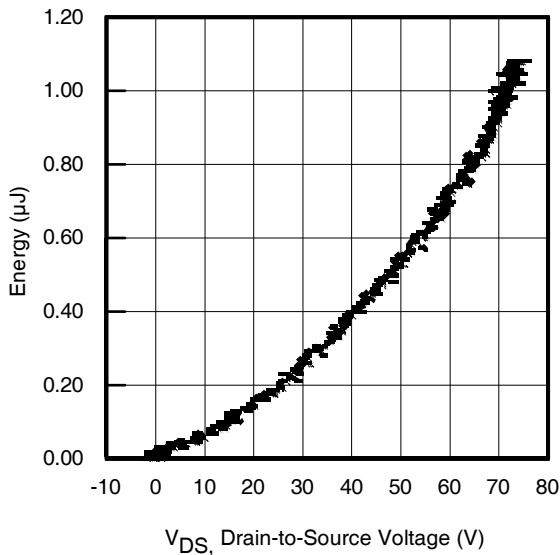


Fig 11. Typical C_{OSS} Stored Energy

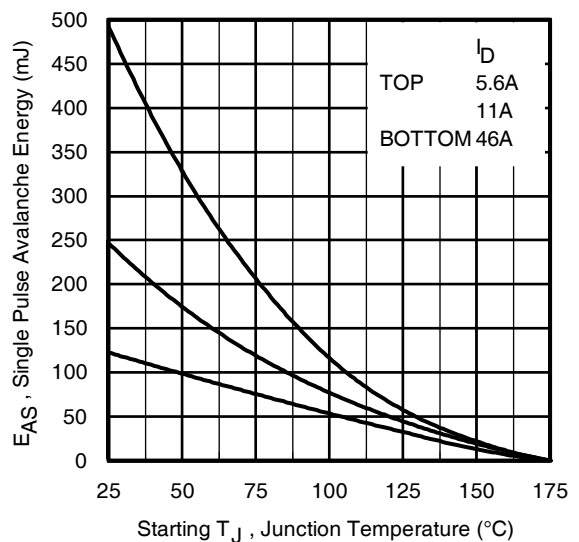


Fig 12. Maximum Avalanche Energy vs. Drain Current

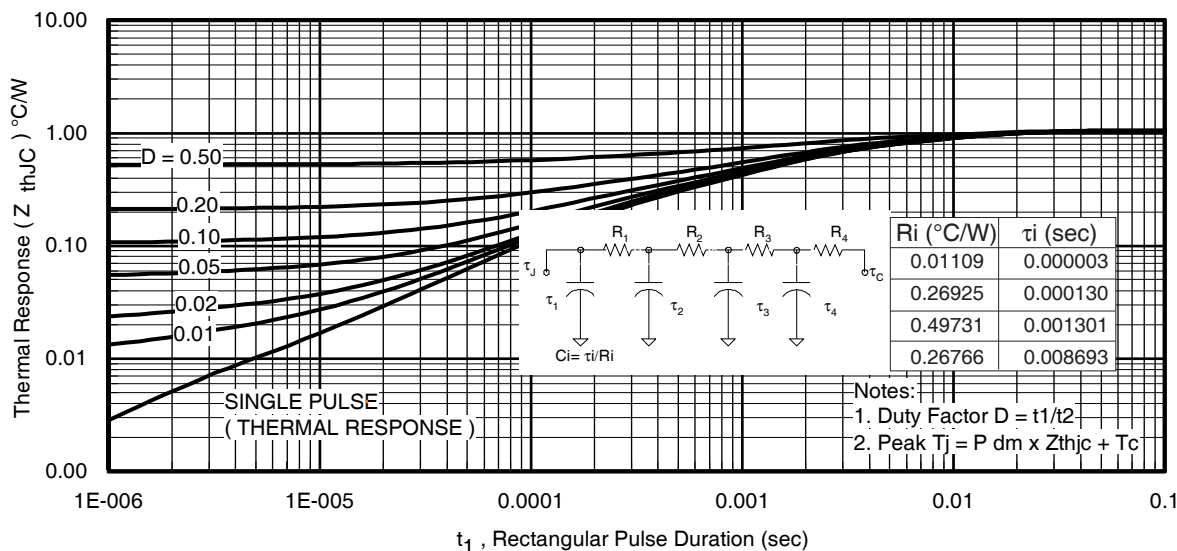


Fig 13. Maximum Effective Transient Thermal Impedance, Junction-to-Case

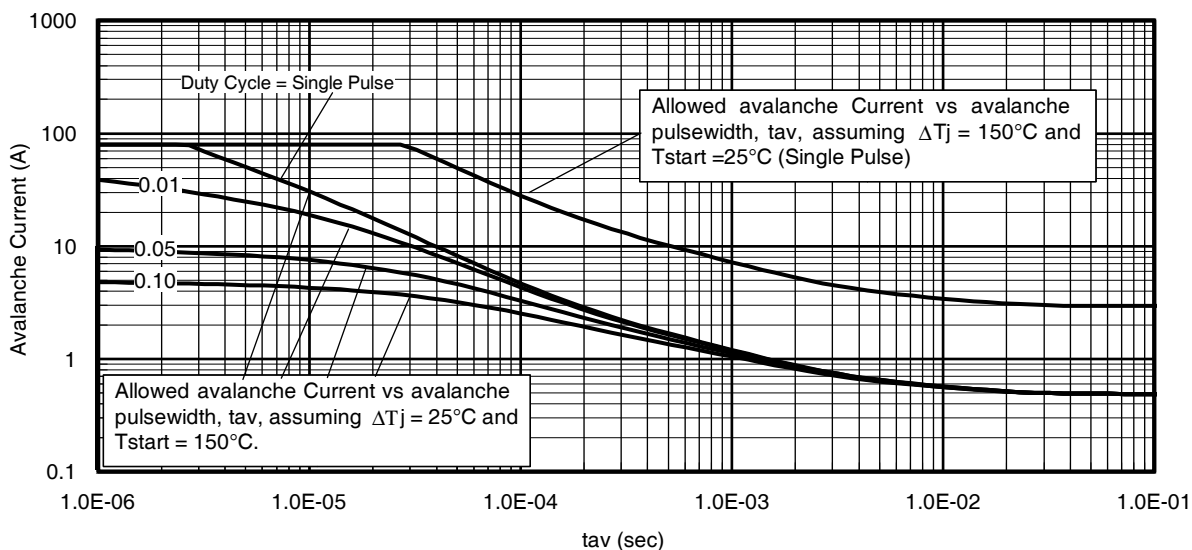


Fig 14. Typical Avalanche Current vs. Pulsewidth

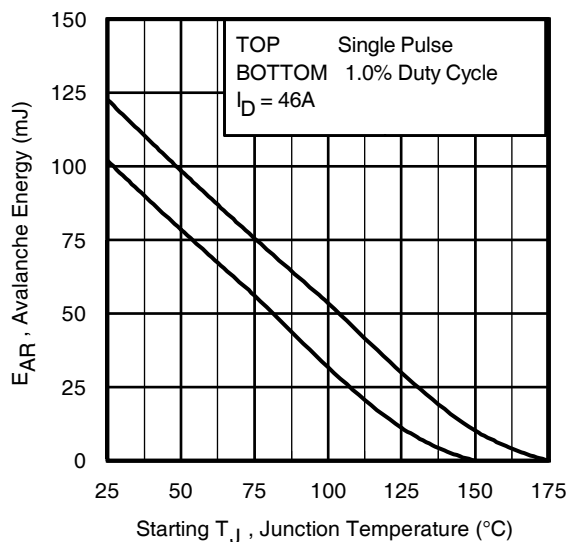


Fig 15. Maximum Avalanche Energy vs. Temperature

Notes on Repetitive Avalanche Curves , Figures 14, 15:
 (For further info, see AN-1005 at www.irf.com)

1. Avalanche failures assumption:
Purely a thermal phenomenon and failure occurs at a temperature far in excess of T_{jmax} . This is validated for every part type.
2. Safe operation in Avalanche is allowed as long as T_{jmax} is not exceeded.
3. Equation below based on circuit and waveforms shown in Figures 22a, 22b.
4. $P_{D(ave)}$ = Average power dissipation per single avalanche pulse.
5. BV = Rated breakdown voltage (1.3 factor accounts for voltage increase during avalanche).
6. I_{av} = Allowable avalanche current.
7. ΔT = Allowable rise in junction temperature, not to exceed T_{jmax} (assumed as 25°C in Figure 14, 15).
 t_{av} = Average time in avalanche.
 D = Duty cycle in avalanche = $t_{av} \cdot f$
 $Z_{thJC}(D, t_{av})$ = Transient thermal resistance, see Figures 13)

$$P_{D(ave)} = 1/2 (1.3 \cdot BV \cdot I_{av}) = \Delta T / Z_{thJC}$$

$$I_{av} = 2\Delta T / [1.3 \cdot BV \cdot Z_{th}]$$

$$E_{AS(AR)} = P_{D(ave)} \cdot t_{av}$$

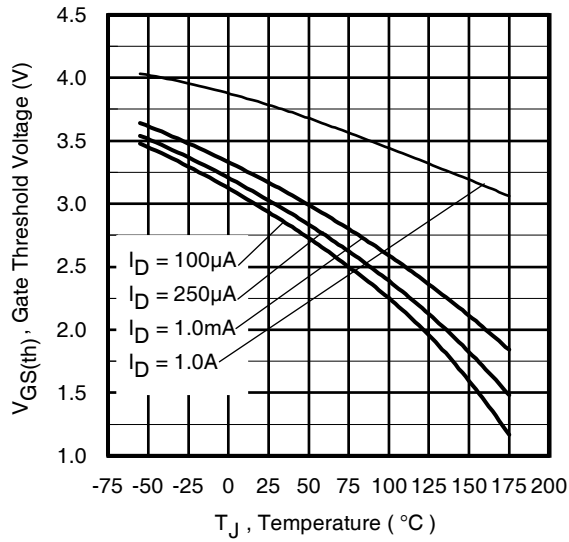


Fig 16. Threshold Voltage vs. Temperature

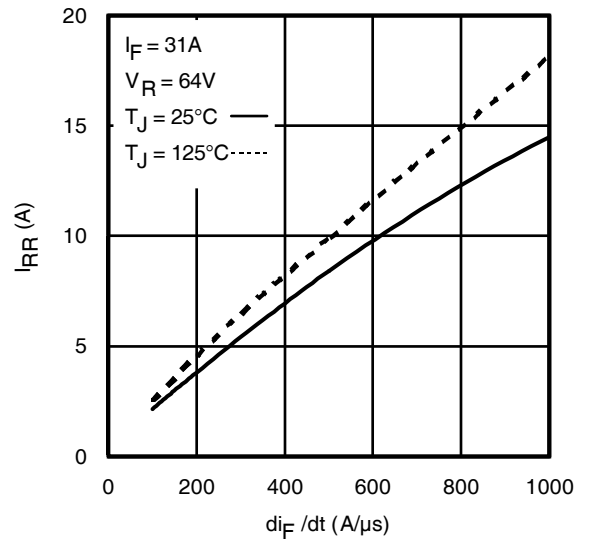


Fig. 17 - Typical Recovery Current vs. di_F/dt

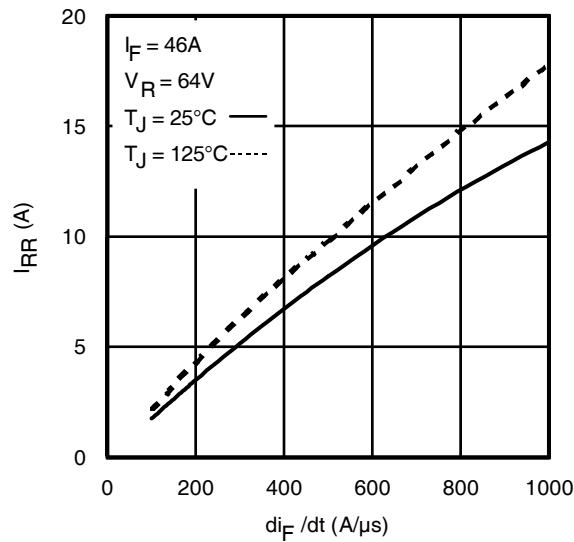


Fig. 18 - Typical Recovery Current vs. di_F/dt

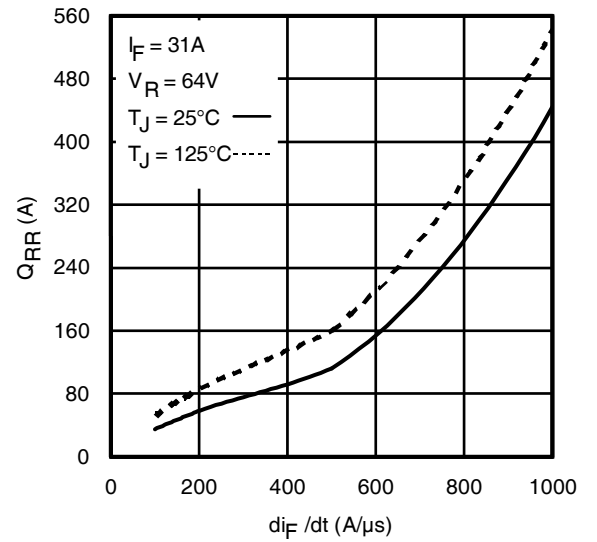


Fig. 19 - Typical Stored Charge vs. di_F/dt

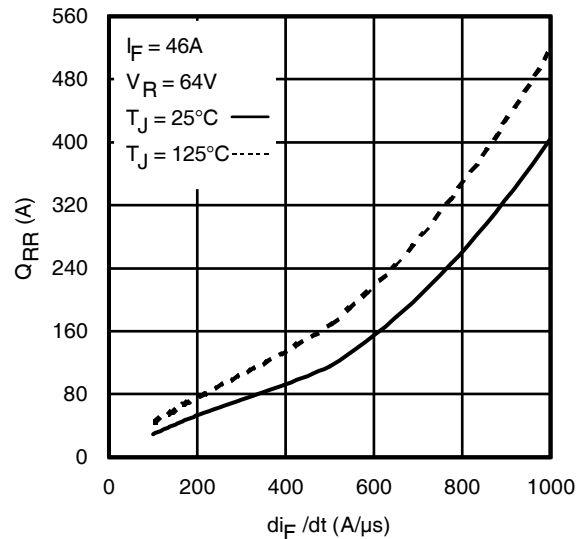
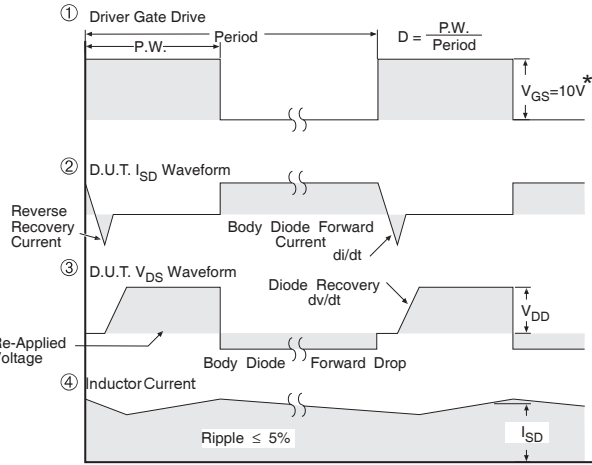
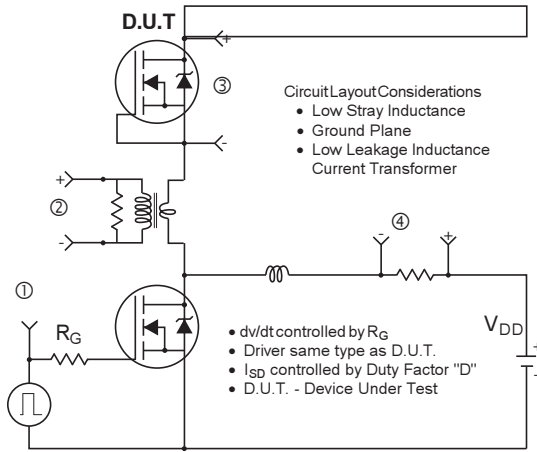


Fig. 20 - Typical Stored Charge vs. di_F/dt



* $V_{GS} = 5V$ for Logic Level Devices

Fig 20. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

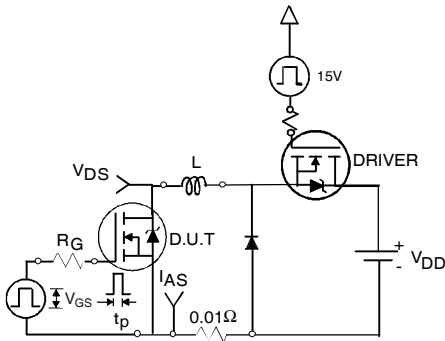


Fig 21a. Unclamped Inductive Test Circuit

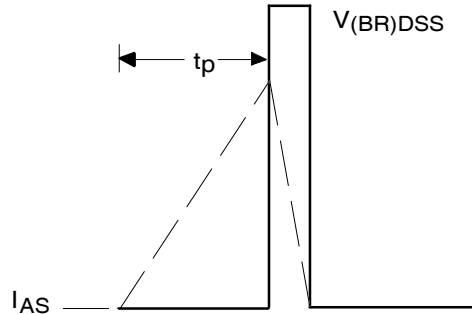


Fig 21b. Unclamped Inductive Waveforms

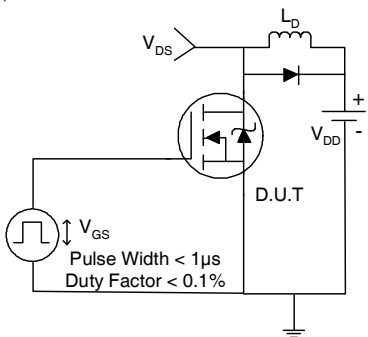


Fig 22a. Switching Time Test Circuit

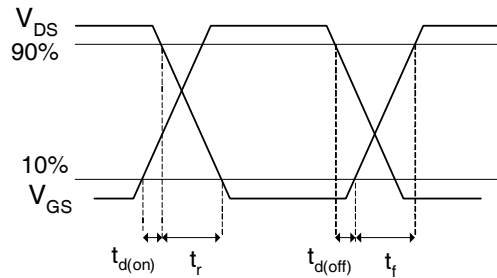


Fig 22b. Switching Time Waveforms

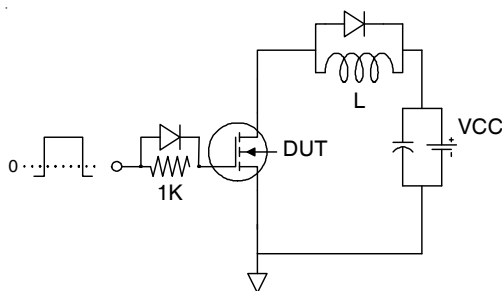


Fig 23a. Gate Charge Test Circuit

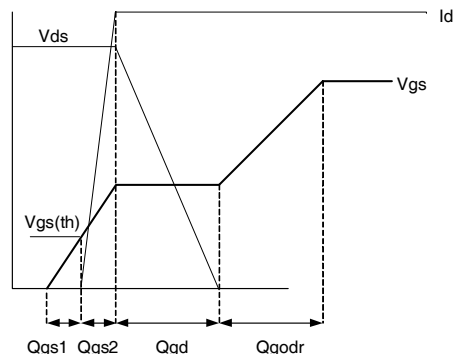
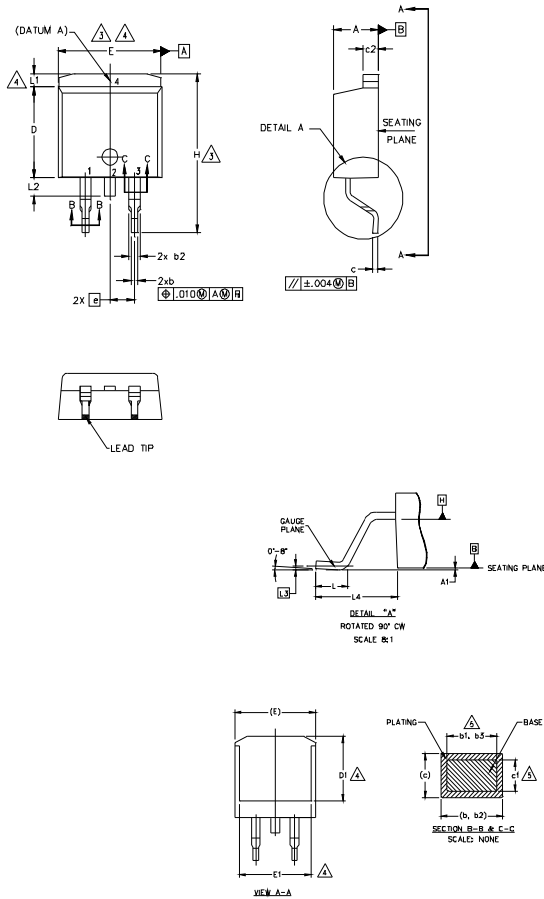


Fig 23b. Gate Charge Waveform

D²Pak Package Outline (Dimensions are shown in millimeters (inches))



- 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 [0.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY AT DATUM H.
 4. THERMAL PAD CONTOUR 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.

SYMBOL	DIMENSIONS				NOTES
	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	5
b2	1.14	1.78	.045	.070	
b3	1.14	1.73	.045	.068	5
c	0.38	0.74	.015	.029	
c1	0.38	0.58	.015	.023	5
c2	1.14	1.65	.045	.065	
D	8.38	9.65	.330	.380	3
D1	6.86	-	.270	-	4
E	9.65	10.67	.380	.420	3,4
E1	6.22	-	.245	-	4
e	2.54 BSC		.100 BSC		
H	14.61	15.88	.575	.625	
L	1.78	2.79	.070	.110	
L1	-	1.65	-	.066	4
L2	1.27	1.78	-	.070	
L3	0.25 BSC		.010 BSC		
L4	4.78	5.28	.188	.208	

LEAD ASSIGNMENTS

HEXFET

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

IGBTs, CoPACK

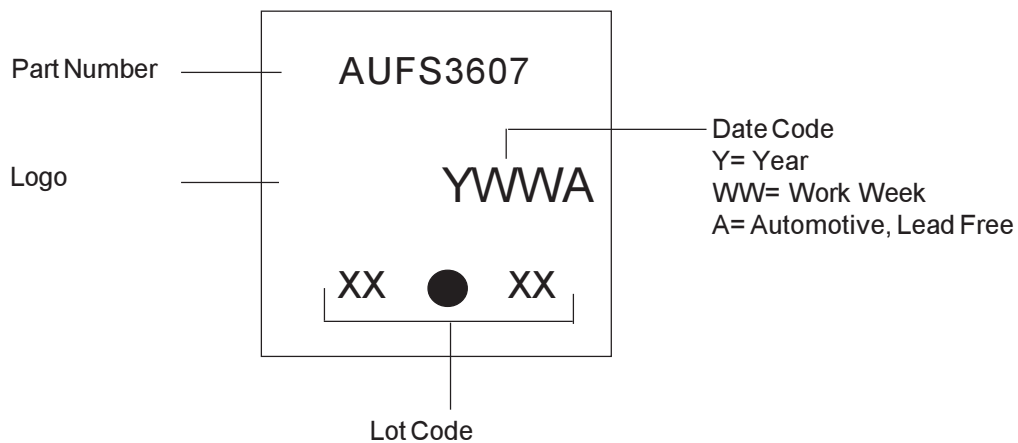
- 1.- GATE
- 2, 4.- COLLECTOR
- 3.- EMITTER

DIODES

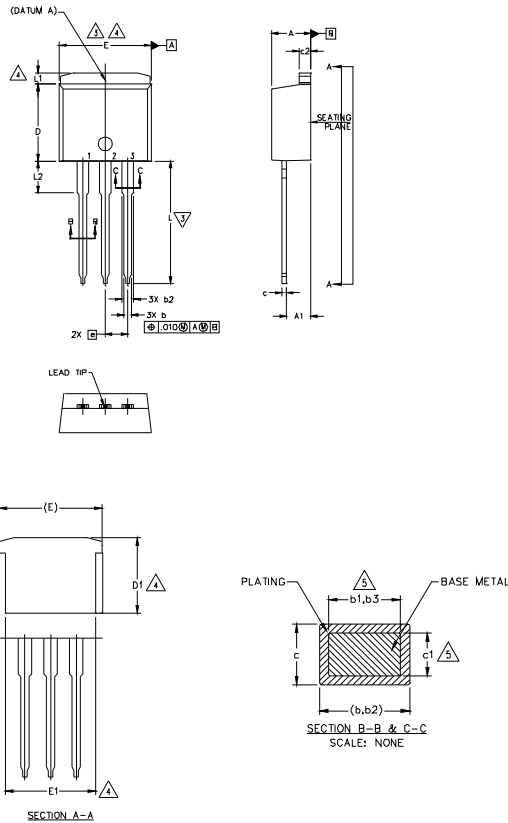
- 1.- ANODE *
- 2, 4.- CATHODE
- 3.- ANODE

* PART DEPENDENT.

D²Pak Part Marking Information



TO-262 Package Outline (Dimensions are shown in millimeters (inches))



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 [0.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.
5. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
6. CONTROLLING DIMENSION: INCH.
7. OUTLINE CONFORM TO JEDEC TO-262 EXCEPT A1(max.), b(min.) AND D1(min.) WHERE DIMENSIONS DERIVED THE ACTUAL PACKAGE OUTLINE.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	
A1	2.03	3.02	.080	.119	
b	0.51	0.99	.020	.039	
b1	0.51	0.89	.020	.035	5
b2	1.14	1.78	.045	.070	
b3	1.14	1.73	.045	.068	5
c	0.38	0.74	.015	.029	
c1	0.38	0.58	.015	.023	5
c2	1.14	1.65	.045	.065	
D	8.38	9.65	.330	.380	3
D1	6.86	-	.270	-	4
E	9.65	10.67	.380	.420	3,4
E1	6.22	-	.245	-	4
e	2.54 BSC		.100 BSC		
L	13.46	14.10	.530	.555	
L1	-	1.65	-	.065	4
L2	3.56	3.71	.140	.146	

LEAD ASSIGNMENTS

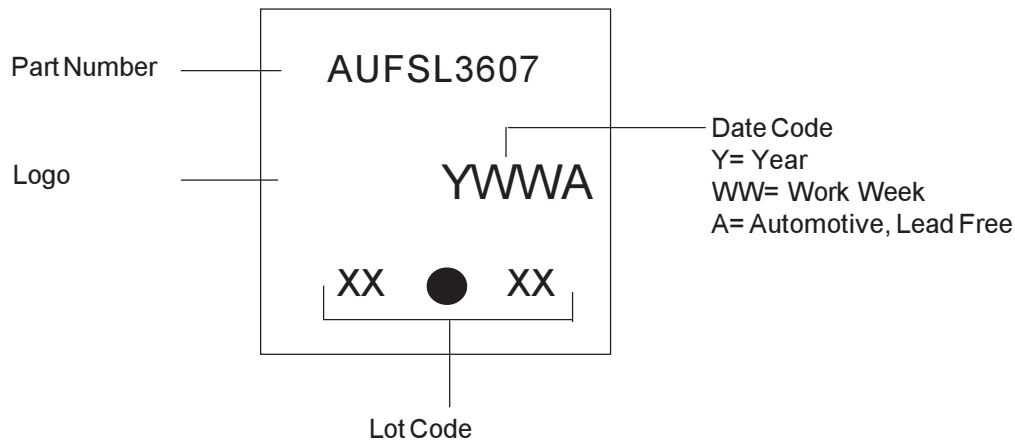
HEXFET

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

IGBTs, CoPACK

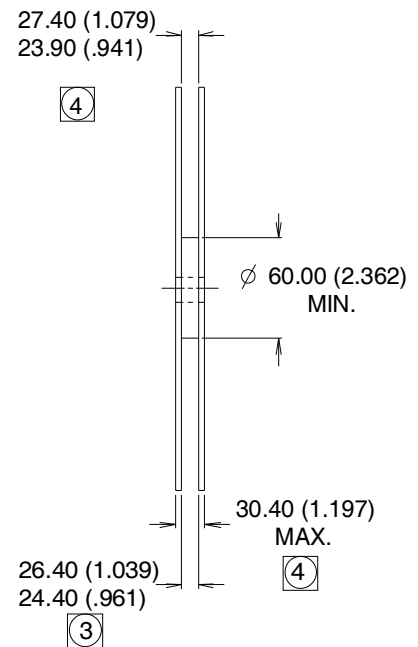
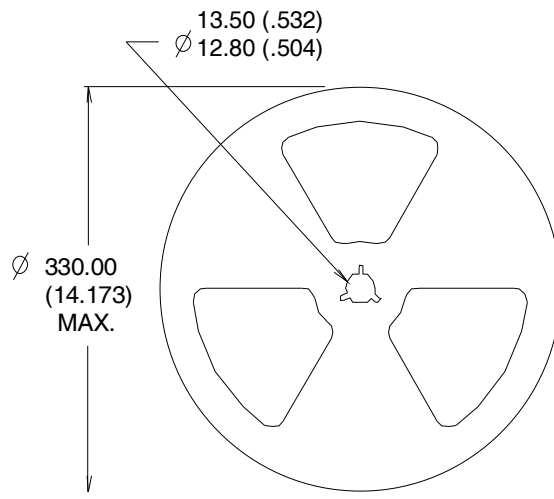
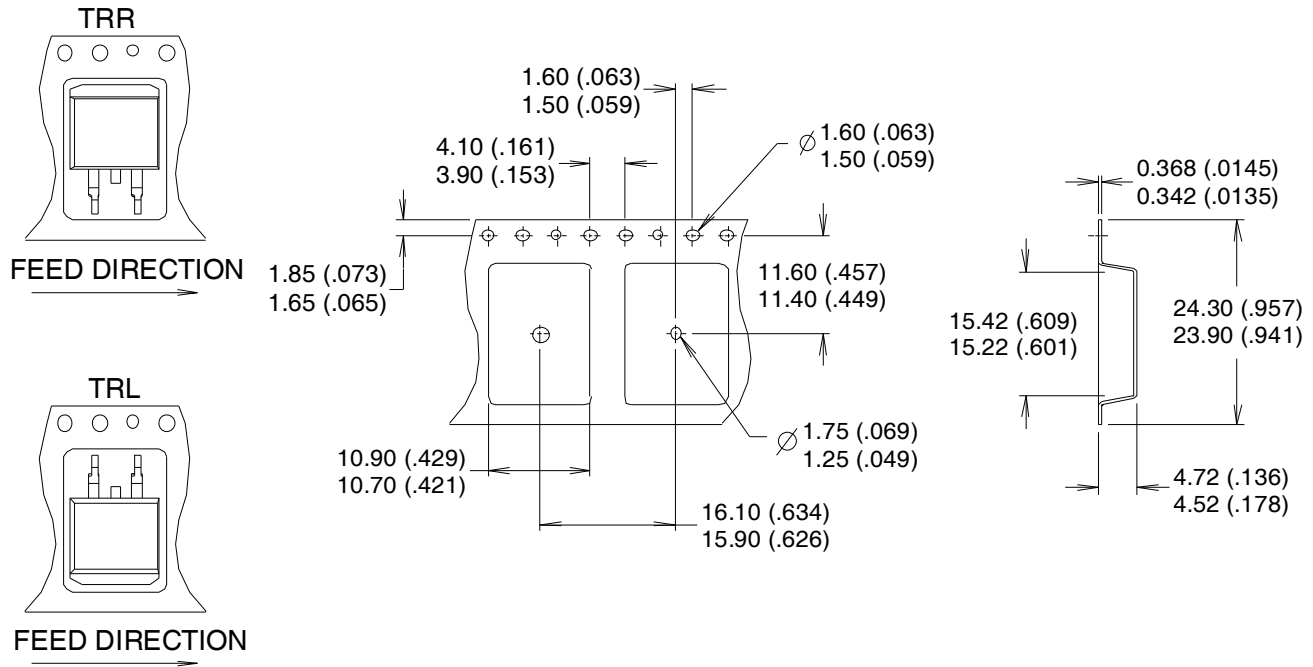
- 1.- GATE
- 2.- COLLECTOR
- 3.- EMITTER
- 4.- COLLECTOR

TO-262 Part Marking Information



D²Pak (TO-263AB) Tape & Reel Information

Dimensions are shown in millimeters (inches)



NOTES :

1. COMFORMS TO EIA-418.
2. CONTROLLING DIMENSION: MILLIMETER.
- ③ DIMENSION MEASURED @ HUB.
- ④ INCLUDES FLANGE DISTORTION @ OUTER EDGE.