Freescale Semiconductor
Technical Data

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RoHS

RF Power Field-Effect Transistor

N-Channel Enhancement-Mode Lateral MOSFETs

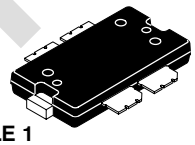
MRF6V2150N
MRF6V2150NB

PREPRODUCTION

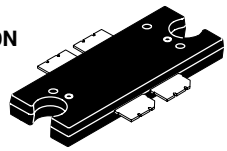
Designed primarily for wideband large-signal output and driver applications with frequencies up to 450 MHz. Devices are unmatched and are suitable for use in industrial, medical and scientific applications.

- Typical CW Performance at 220 MHz: V_{DD} = 50 Volts, I_{DQ} = 450 mA, P_{out} = 150 Watts
  - Power Gain — 25.5 dB
  - Drain Efficiency — 69%
- Capable of Handling 10:1 VSWR, @ 50 Vdc, 210 MHz, 150 Watts Output Power
- Integrated ESD Protection
- Excellent Thermal Stability
- Facilitates Manual Gain Control, ALC and Modulation Techniques
- 225°C Capable Plastic Package
- RoHS Compliant

10-450 MHz, 150 W, 50 V
LATERAL N-CHANNEL
SINGLE-ENDED
BROADBAND
RF POWER MOSFETs



CASE 1486-03, STYLE 1
TO-270 WB-4
PLASTIC
MRF6V2300N



CASE 1484-04, STYLE 1
TO-272 WB-4
PLASTIC
MRF6V2300NB

PARTS ARE SINGLE-ENDED

PRELIMINARY

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	-0.5 +110	Vdc
Gate-Source Voltage	V_{GS}	-0.5 +12	Vdc
Storage Temperature Range	T_{stg}	-65 to +150	°C
Operating Junction Temperature (1,2)	T_J	225	°C

Table 2. Thermal Characteristics

Characteristic	Symbol	Value (3)	Unit
Thermal Resistance, Junction to Case Case Temperature TBD°C, TBD W CW Case Temperature TBD°C, TBD W CW	$R_{\theta JC}$	 TBD TBD	°C/W

1. Continuous use at maximum temperature will affect MTTF.
2. MTTF calculator available at http://www.freescale.com/rf. Select Tools/Software/Application Software/Calculators to access the MTTF calculators by product. (Calculator available when part is in production.)
3. Refer to AN1955, *Thermal Measurement Methodology of RF Power Amplifiers.* Go to http://www.freescale.com/rf. Select Documentation/Application Notes - AN1955.

This document contains information on a preproduction product. Specifications and information herein are subject to change without notice.

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freescale semiconductor

Table 3. ESD Protection Characteristics

Test Methodology	Class
Human Body Model (per JESD22-A114)	TBD (Minimum)
Machine Model (per EIA/JESD22-A115)	TBD (Minimum)
Charge Device Model (per JESD22-C101)	TBD (Minimum)

Table 4. Moisture Sensitivity Level

Test Methodology	Rating	Package Peak Temperature	Unit
Per JESD 22-A113, IPC/JEDEC J-STD-020	3	260	°C

Table 5. Electrical Characteristics (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Off Characteristics					
Zero Gate Voltage Drain Leakage Current (V_{DS} = 110 Vdc, V_{GS} = 0 Vdc)	I_{DSS}	—	—	10	μAdc
Zero Gate Voltage Drain Leakage Current (V_{DS} = 50 Vdc, V_{GS} = 0 Vdc)	I_{DSS}	—	—	10	μAdc
Drain-Source Breakdown Voltage (I_D = 75 mA, V_{GS} = 0 Vdc)	BV_{DSS}	110	—	—	Vdc
Gate-Source Leakage Current (V_{GS} = 5 Vdc, V_{DS} = 0 Vdc)	I_{GSS}	—	—	10	μAdc
On Characteristics					
Gate Threshold Voltage (V_{DS} = 10 Vdc, I_D = 400 μAdc)	$V_{GS(th)}$	—	2.4	—	Vdc
Drain-Source On-Voltage (V_{GS} = 10 Vdc, I_D = 1 Adc)	$V_{DS(on)}$	—	0.3	—	Vdc
Dynamic Characteristics					
Reverse Transfer Capacitance (V_{DS} = 50 Vdc, V_{GS} = 0 Vdc, f = 1.0 MHz)	C_{rss}	—	1.54	—	pF
Output Capacitance (V_{DS} = 50 Vdc, V_{GS} = 0 Vdc, f = 1.0 MHz)	C_{oss}	—	94	—	pF
Input Capacitance (V_{DS} = 50 Vdc, V_{GS} = 0 Vdc, f = 1.0 MHz)	C_{iss}	—	163	—	pF
Functional Tests (In Freescale Test Fixture, 50 ohm system) V_{DD} = 50 Vdc, I_{DQ} = 450 mA, P_{out} = 150 W, f = 220 MHz, CW					
Power Gain	G_{ps}	—	25.5	—	dB
Drain Efficiency	η_D	—	69	—	%
Input Return Loss	IRL	—	-17	—	dB
P_{out} @ 1 dB Compression Point, CW (f = 220 MHz)	P1dB	—	165	—	W

PRELIMINARY



ATTENTION: The MRF6V2150N and MRF6V2150NB are high power devices and special considerations must be followed in board design and mounting. Incorrect mounting can lead to internal temperatures which exceed the maximum allowable operating junction temperature. Refer to Freescale Application Note AN3263 (for bolt down mounting) or AN1907 (for solder reflow mounting) **PRIOR TO STARTING SYSTEM DESIGN** to ensure proper mounting of these devices.

TYPICAL CHARACTERISTICS

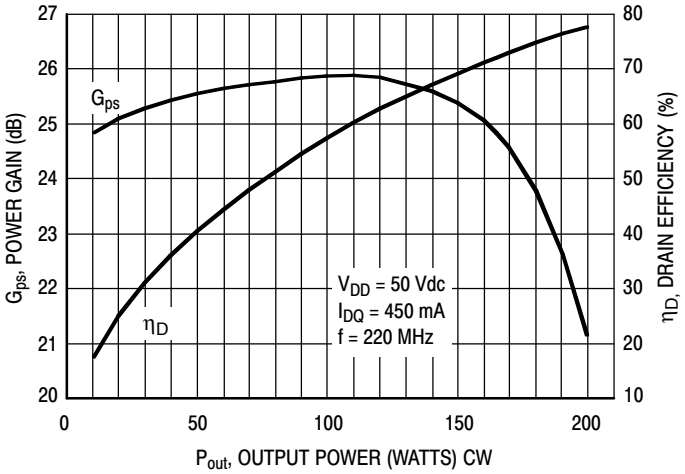


Figure 1. Power Gain and Drain Efficiency versus CW Output Power

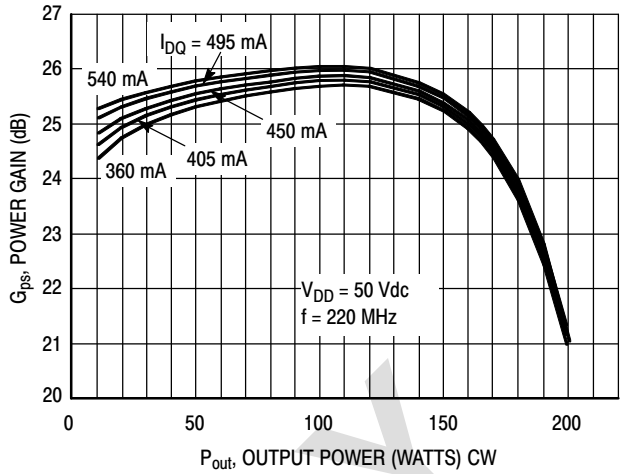


Figure 2. Power Gain versus Output Power

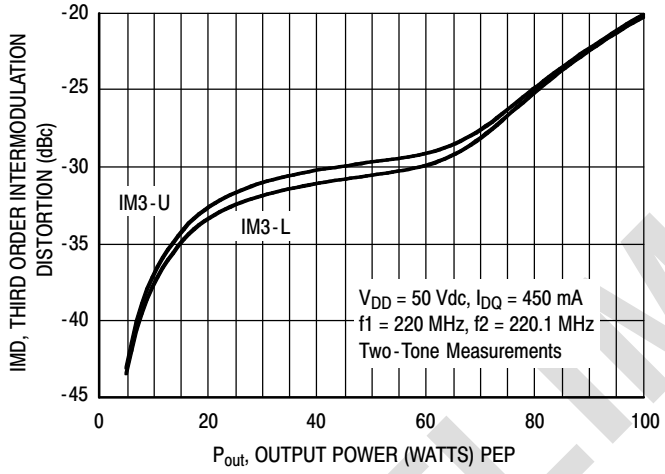


Figure 3. Third Order Intermodulation Distortion versus Output Power

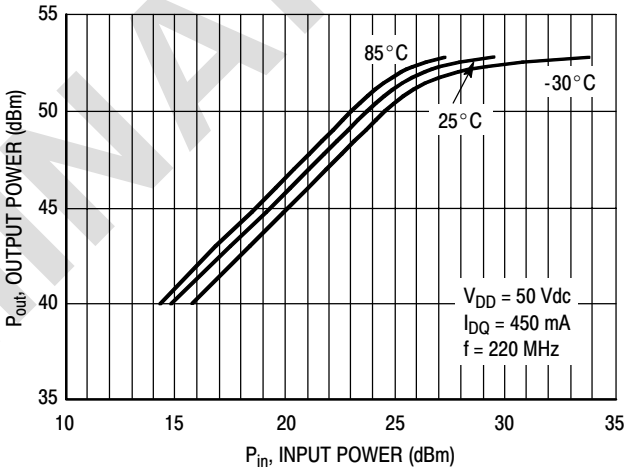
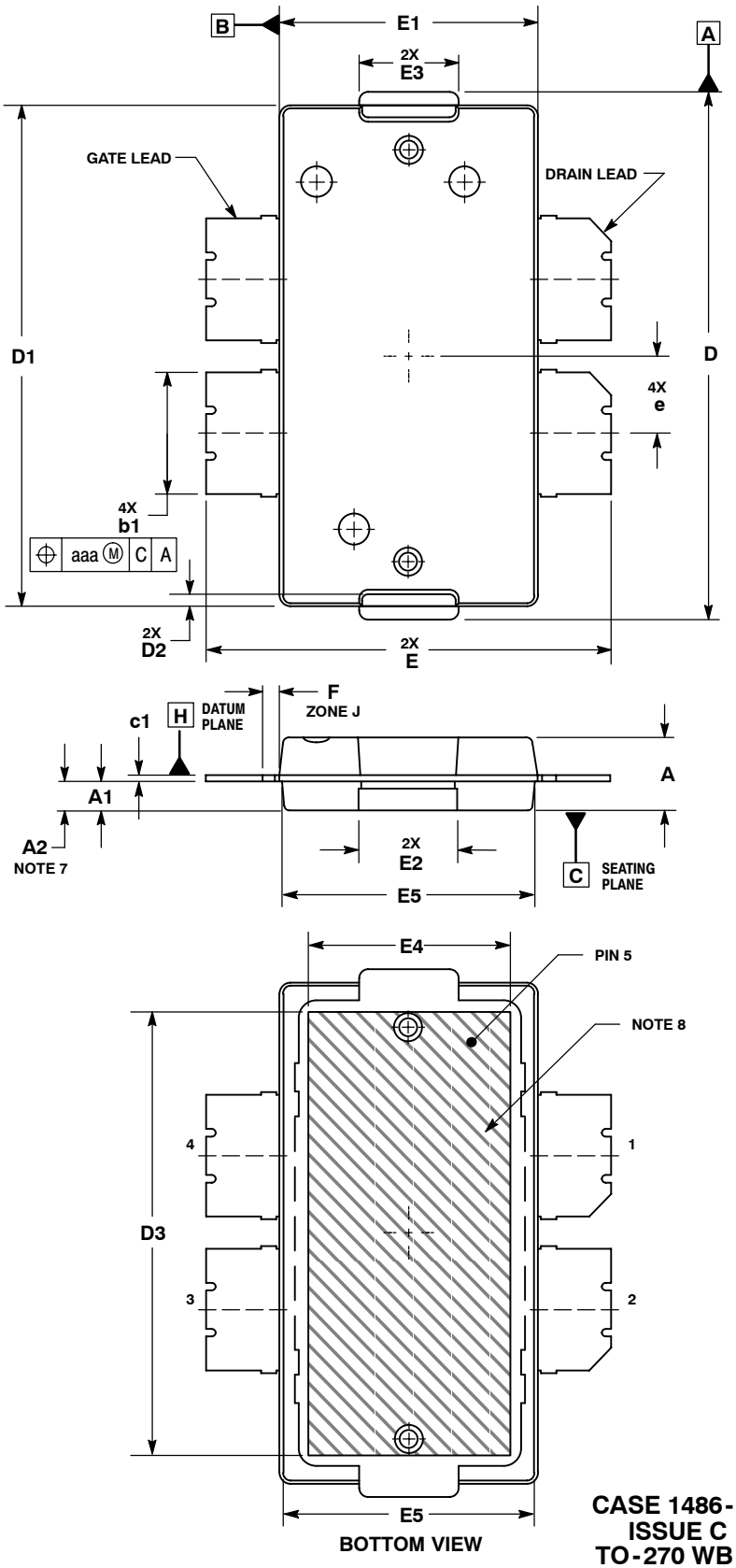


Figure 4. Output Power versus Input Power over Temperature

PRELIMINARY

PACKAGE DIMENSIONS

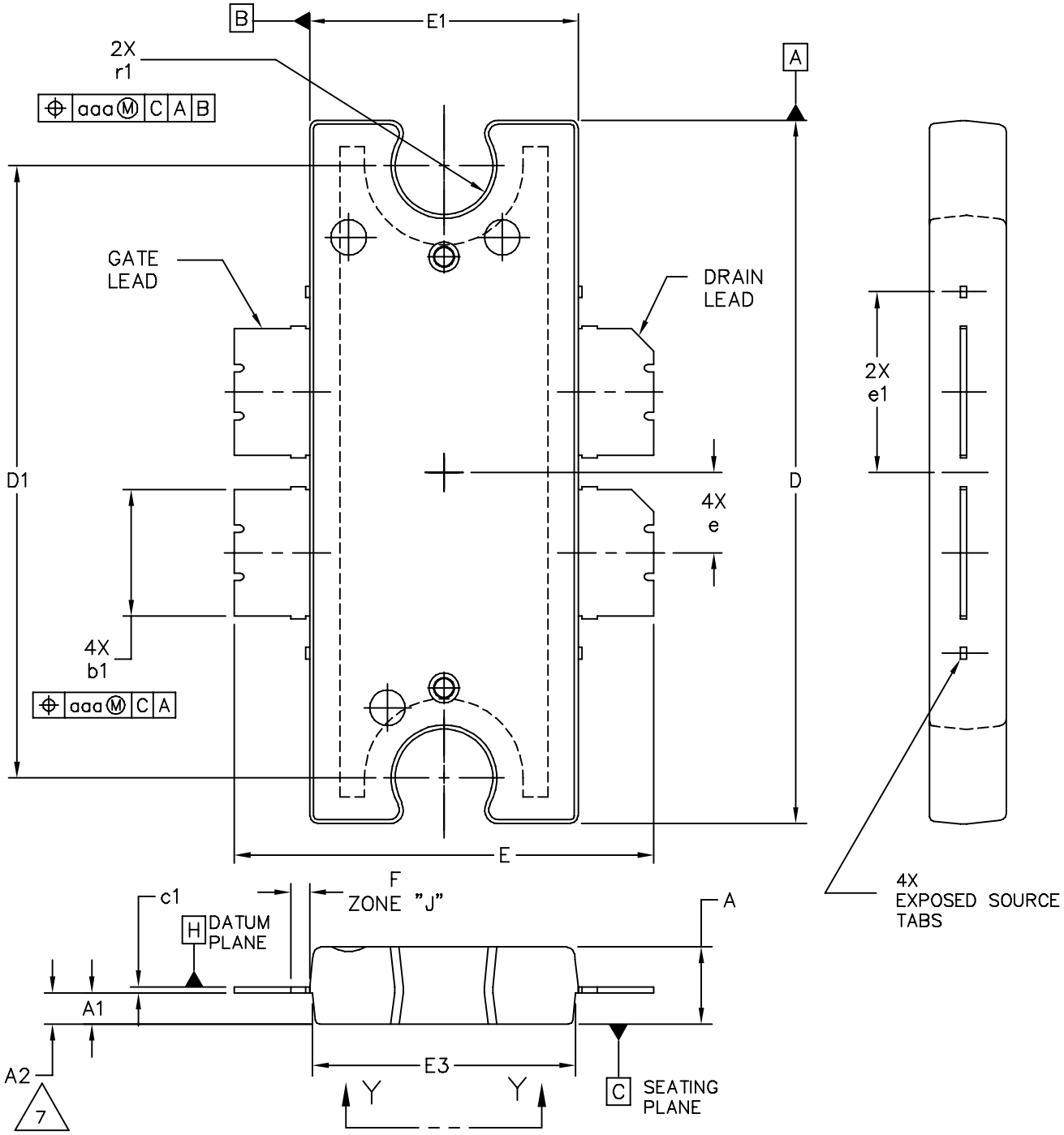


NOTES:
1. CONTROLLING DIMENSION: INCH.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M-1994.
3. DATUM PLANE -H- IS LOCATED AT THE TOP OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE TOP OF THE PARTING LINE.
4. DIMENSIONS "D" AND "E1" DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS .006 PER SIDE. DIMENSIONS "D" AND "E1" DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
5. DIMENSION "b1" DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE .005 TOTAL IN EXCESS OF THE "b1" DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. DATUMS -A- AND -B- TO BE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION A2 APPLIES WITHIN ZONE "J" ONLY.
8. HATCHING REPRESENTS THE EXPOSED AREA OF THE HEAT SLUG.

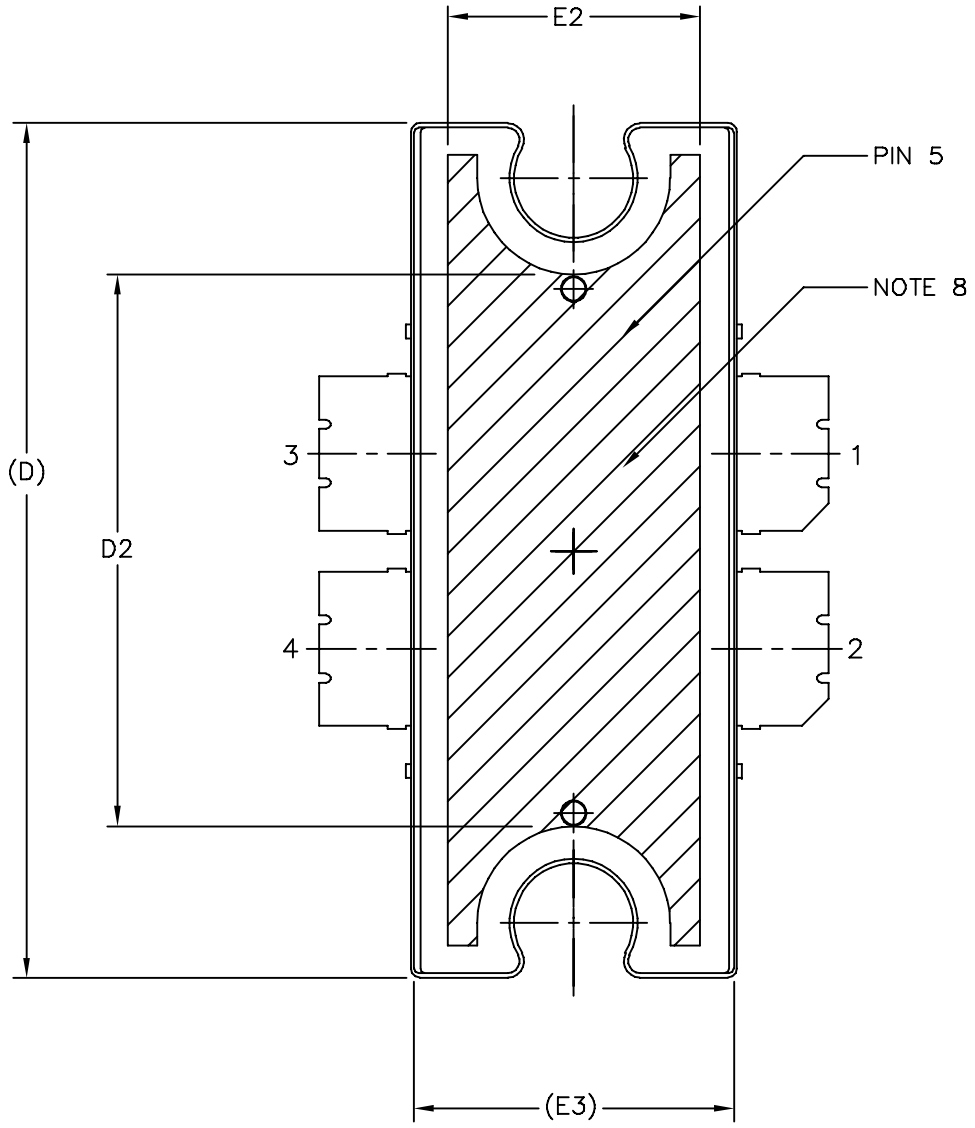
	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	.100	.104	2.54	2.64
A1	.039	.043	0.99	1.09
A2	.040	.042	1.02	1.07
D	.712	.720	18.08	18.29
D1	.688	.692	17.48	17.58
D2	.011	.019	0.28	0.48
D3	.600	---	15.24	---
E	.551	.559	14	14.2
E1	.353	.357	8.97	9.07
E2	.132	.140	3.35	3.56
E3	.124	.132	3.15	3.35
E4	.270	---	6.86	---
E5	.346	.350	8.79	8.89
F	.025 BSC		0.64 BSC	
b1	.164	.170	4.17	4.32
c1	.007	.011	0.18	0.28
e	.106 BSC		2.69 BSC	
aaa	.004		0.10	

STYLE 1:
PIN 1. DRAIN
2. DRAIN
3. GATE
4. GATE
5. SOURCE

CASE 1486-03
ISSUE C
TO-270 WB-4
PLASTIC
MRF6V2150N



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	CASE NUMBER: 1484−04	05 APR 2006
	STANDARD: NON−JEDEC	



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	STANDARD: NON−JEDEC	

NOTES:

1. CONTROLLING DIMENSION: INCH
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M−1994.
3. DATUM PLANE H IS LOCATED AT THE TOP OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE TOP OF THE PARTING LINE.
4. DIMENSIONS "D" AND "E1" DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS .006 PER SIDE. DIMENSIONS "D" AND "E1" DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE H.
5. DIMENSIONS "b1" DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE .005 TOTAL IN EXCESS OF THE "b1" DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. DATUM A AND B TO BE DETERMINED AT DATUM PLANE H.
7. DIMENSION A2 APPLIES WITHIN ZONE "J" ONLY.
8. HATCHING REPRESENTS EXPOSED AREA OF THE HEAT SLUG. HATCHED AREA SHOWN IS ON THE SAME PLANE.

STYLE 1:
PIN 1 − DRAIN PIN 2 − DRAIN
PIN 3 − GATE PIN 4 − GATE
PIN 5 − SOURCE

DIM	INCH MIN	INCH MAX	MILLIMETER MIN	MILLIMETER MAX	DIM	INCH MIN	INCH MAX	MILLIMETER MIN	MILLIMETER MAX
A	.100	.104	2.54	2.64	b1	.164	.170	4.17	4.32
A1	.039	.043	0.99	1.09	c1	.007	.011	.18	.28
A2	.040	.042	1.02	1.07	r1	.063	.068	1.60	1.73
D	.928	.932	23.57	23.67	e	.106 BSC		2.69 BSC	
D1	.810 BSC		20.57 BSC		e1	.239 INFO ONLY		6.07 INFO ONLY	
D2	.600	−−−	15.24	−−−	aaa	.004		.10	
E	.551	.559	14	14.2					
E1	.353	.357	8.97	9.07					
E2	.270	−−−	6.86	−−−					
E3	.346	.350	8.79	8.89					
F	.025 BSC		0.64 BSC						

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	STANDARD: NON−JEDEC	

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