



**THE DATASHEET OF  
MRF373ALR1**



# RF Power Field Effect Transistors

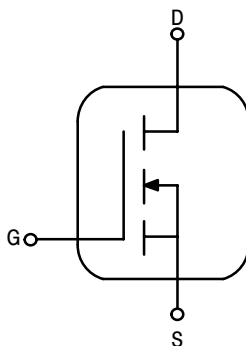
## N-Channel Enhancement-Mode Lateral MOSFETs

Designed for broadband commercial and industrial applications with frequencies from 470 to 860 MHz. The high gain and broadband performance of these devices make them ideal for large-signal, common source amplifier applications in 28/32 volt transmitter equipment.

- Typical CW Performance at 860 MHz, 32 Volts, Narrowband Fixture  
Output Power — 75 Watts  
Power Gain — 18.2 dB  
Efficiency — 60%
- Capable of Handling 10:1 VSWR @ 32 Vdc, 860 MHz,  
75 Watts CW Output Power

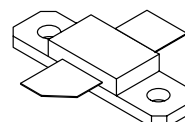
### Features

- Integrated ESD Protection
- Excellent Thermal Stability
- Characterized with Series Equivalent Large-Signal Impedance Parameters
- Low Gold Plating Thickness on Leads. L Suffix Indicates 40μ" Nominal.
- RoHS Compliant
- In Tape and Reel. R1 = 500 units per 32 mm, 13 inch Reel.

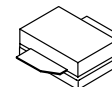


**MRF373ALR1**  
**MRF373ALSR1**

**470-860 MHz, 75 W, 32 V**  
**LATERAL N-CHANNEL**  
**BROADBAND**  
**RF POWER MOSFETs**



**CASE 360B-05, STYLE 1**  
**NI-360**  
**MRF373ALR1**



**CASE 360C-05, STYLE 1**  
**NI-360S**  
**MRF373ALSR1**

**Table 1. Maximum Ratings**

Rating	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	-0.5, +70	Vdc
Gate-Source Voltage	$V_{GS}$	-0.5, +15	Vdc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	MRF373ALR1 $P_D$ MRF373ALSR1	197 1.12 278 1.59	W W/°C W W/°C
Storage Temperature Range	$T_{stg}$	-65 to +150	°C
Case Operating Temperature	$T_C$	150	°C
Operating Junction Temperature	$T_J$	200	°C

**Table 2. Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case	MRF373ALR1 MRF373ALSR1 $R_{\theta JC}$	0.89 0.63	°C/W

**Table 3. ESD Protection Characteristics**

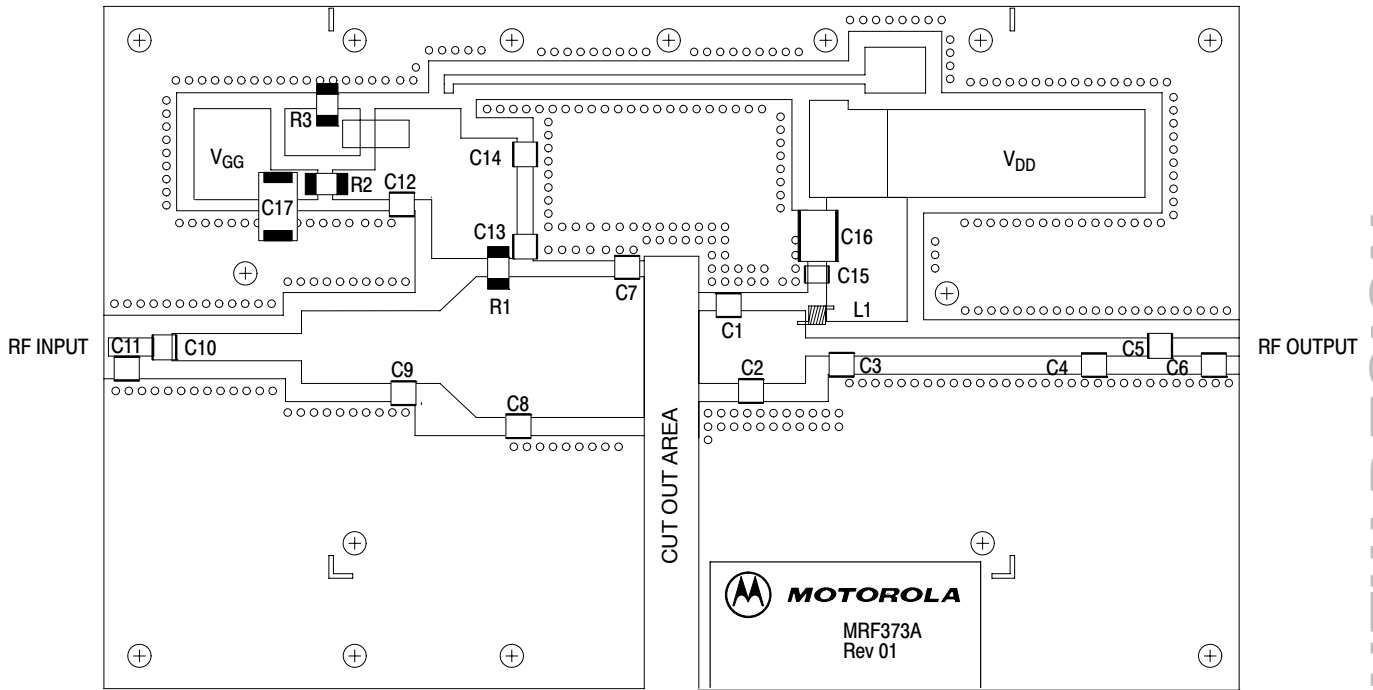
Test Conditions	Class
Human Body Model	1 (Minimum)
Machine Model	M2 (Minimum) M1 (Minimum)

**Table 4. Electrical Characteristics** ( $T_C = 25^\circ\text{C}$  unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>Off Characteristics</b>					
Drain-Source Breakdown Voltage ( $V_{GS} = 0\text{ Vdc}$ , $I_D = 1\ \mu\text{A}$ )	$V_{(BR)DSS}$	70	—	—	Vdc
Zero Gate Voltage Drain Current ( $V_{DS} = 32\text{ Vdc}$ , $V_{GS} = 0\text{ Vdc}$ )	$I_{DSS}$	—	—	1	$\mu\text{Adc}$
Gate-Source Leakage Current ( $V_{GS} = 5\text{ Vdc}$ , $V_{DS} = 0\text{ Vdc}$ )	$I_{GSS}$	—	—	1	$\mu\text{Adc}$
<b>On Characteristics</b>					
Gate Threshold Voltage ( $V_{DS} = 10\text{ V}$ , $I_D = 200\ \mu\text{A}$ )	$V_{GS(th)}$	2	2.9	4	Vdc
Gate Quiescent Voltage ( $V_{DS} = 32\text{ V}$ , $I_D = 100\text{ mA}$ )	$V_{GS(Q)}$	2.5	3.3	4.5	Vdc
Drain-Source On-Voltage ( $V_{GS} = 10\text{ V}$ , $I_D = 3\text{ A}$ )	$V_{DS(on)}$	—	0.41	0.45	Vdc
<b>Dynamic Characteristics</b>					
Input Capacitance ( $V_{DS} = 32\text{ V}$ , $V_{GS} = 0$ , $f = 1\text{ MHz}$ )	$C_{iss}$	—	98.5	—	pF
Output Capacitance ( $V_{DS} = 32\text{ V}$ , $V_{GS} = 0$ , $f = 1\text{ MHz}$ )	$C_{oss}$	—	49	—	pF
Reverse Transfer Capacitance ( $V_{DS} = 32\text{ V}$ , $V_{GS} = 0$ , $f = 1\text{ MHz}$ )	$C_{rss}$	—	2	—	pF
<b>Functional Characteristics</b> (50 ohm system)					
Common Source Power Gain ( $V_{DD} = 32\text{ V}$ , $P_{out} = 75\text{ W CW}$ , $I_{DQ} = 200\text{ mA}$ , $f = 860\text{ MHz}$ )	$G_{ps}$	16.5	18.2	—	dB
Drain Efficiency ( $V_{DD} = 32\text{ V}$ , $P_{out} = 75\text{ W CW}$ , $I_{DQ} = 200\text{ mA}$ , $f = 860\text{ MHz}$ )	$\eta$	56	60	—	%

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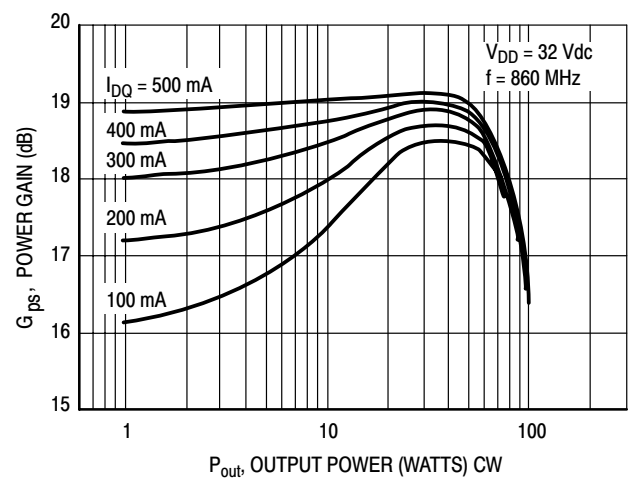
Freescale has begun the transition of marking Printed Circuit Boards (PCBs) with the Freescale Semiconductor signature/logo. PCBs may have either Motorola or Freescale markings during the transition period. These changes will have no impact on form, fit or function of the current product.

**Figure 1. MRF373ALR1/ALSR1 Narrowband Test Circuit Component Layout**

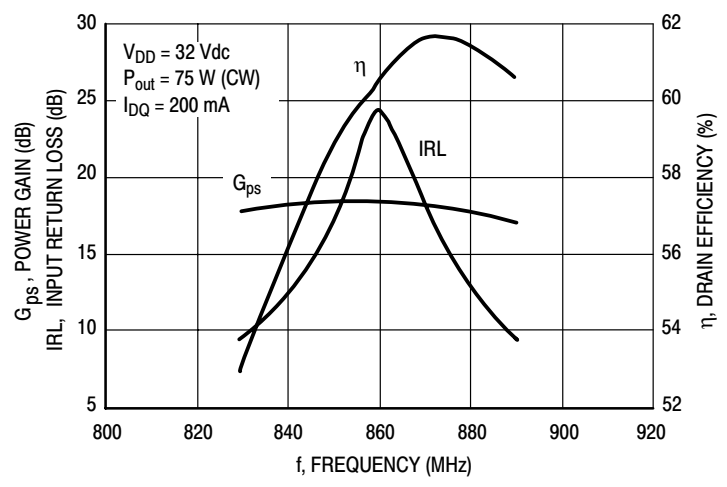
**Table 5. MRF373ALR1/ALSR1 Narrowband Test Circuit Component Layout Designations and Values**

Designation	Description
C1, C2	18 pF Chip Capacitors
C3	12 pF Chip Capacitor
C4	1.8 pF Chip Capacitor
C5, C10	51 pF Chip Capacitors
C6	0.3 pF Chip Capacitor (Used only on the MRF373AS)
C7	15 pF Chip Capacitor
C8	10 pF Chip Capacitor
C9	2.7 pF Chip Capacitor
C11	0.5 pF Chip Capacitor
C12	1000 pF Chip Capacitor
C13	39 pF Chip Capacitor
C14, C15	470 pF Chip Capacitors
C16	2.2 $\mu$ F, 100 V Chip Capacitor
C17	10 $\mu$ F, 35 V Tantalum Capacitor
L1A	12 nH, Coilcraft
R1, R2	390 $\Omega$ , 1/2 W Chip Resistors (2010)
R3	1 k $\Omega$ , 1/2 W Chip Resistor (2010)
PCB	Arlon GX-0300-55, 30 mils, $\epsilon_r = 2.55$

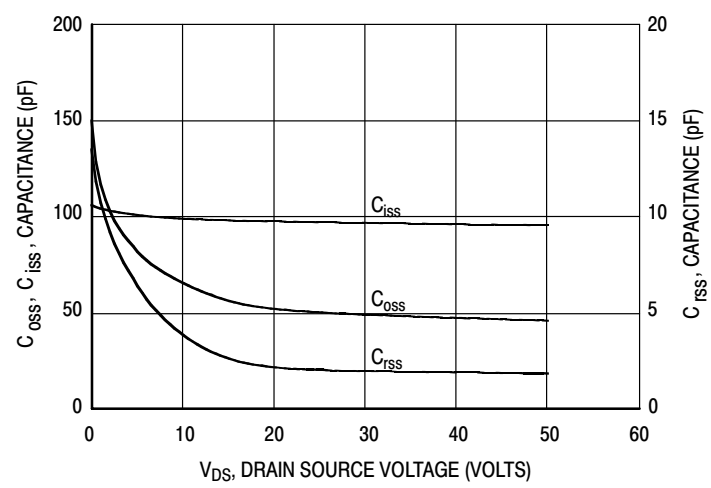
**TYPICAL CHARACTERISTICS**



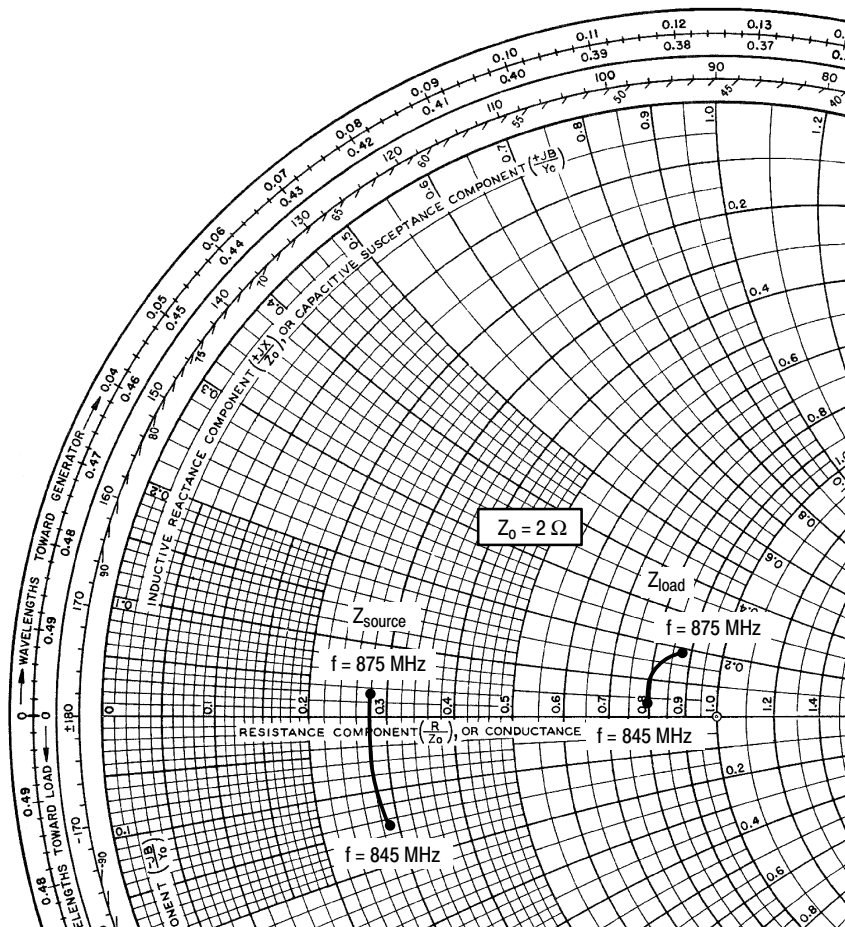
**Figure 2. Power Gain versus Output Power**



**Figure 3. Performance in Narrowband Circuit**



**Figure 4. Capacitance versus Voltage**



$V_{DD} = 32\text{ V}$ ,  $I_{DQ} = 200\text{ mA}$ ,  $P_{out} = 75\text{ W CW}$

f MHz	$Z_{source}$ $\Omega$	$Z_{load}$ $\Omega$
845	$0.58 - j0.29$	$1.60 + j0.07$
860	$0.56 - j0.11$	$1.65 + j0.22$
875	$0.56 + j0.06$	$1.79 + j0.38$

$Z_{source}$  = Test circuit impedance as measured from gate to ground.

$Z_{load}$  = Test circuit impedance as measured from drain to ground.

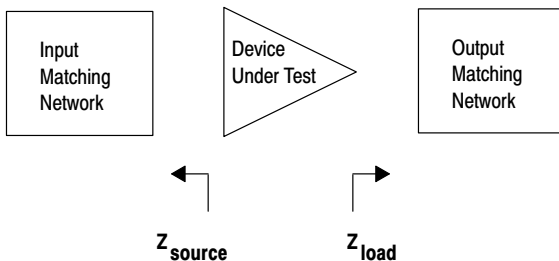
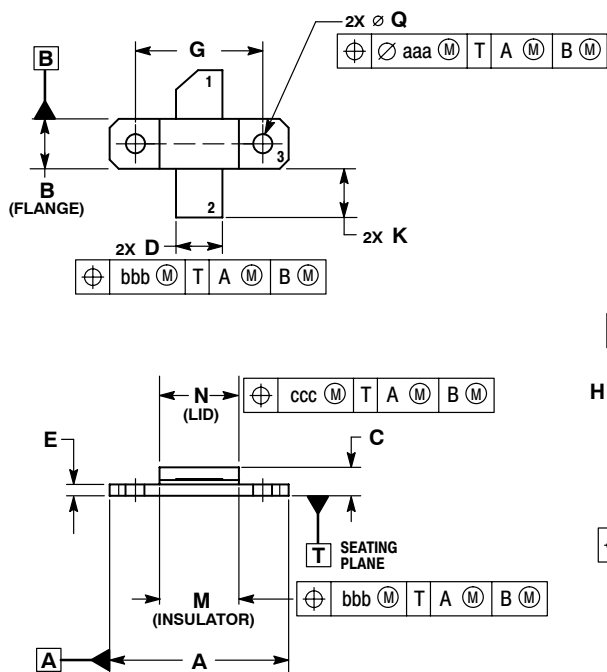


Figure 5. Series Equivalent Source and Load Impedance

### PACKAGE DIMENSIONS



NOTES:

1. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION H IS MEASURED 0.030 (0.762) AWAY FROM PACKAGE BODY.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.795	0.805	20.19	20.45
B	0.225	0.235	5.72	5.97
C	0.125	0.175	3.18	4.45
D	0.210	0.220	5.33	5.59
E	0.055	0.065	1.40	1.65
F	0.004	0.006	0.10	0.15
G	0.562 BSC		14.28 BSC	
H	0.077	0.087	1.96	2.21
K	0.220	0.250	5.59	6.35
M	0.355	0.365	9.02	9.27
N	0.357	0.363	9.07	9.22
Q	0.125	0.135	3.18	3.43
R	0.227	0.233	5.77	5.92
S	0.225	0.235	5.72	5.97
aaa	0.005 REF		0.13 REF	
bbb	0.010 REF		0.25 REF	
ccc	0.015 REF		0.38 REF	

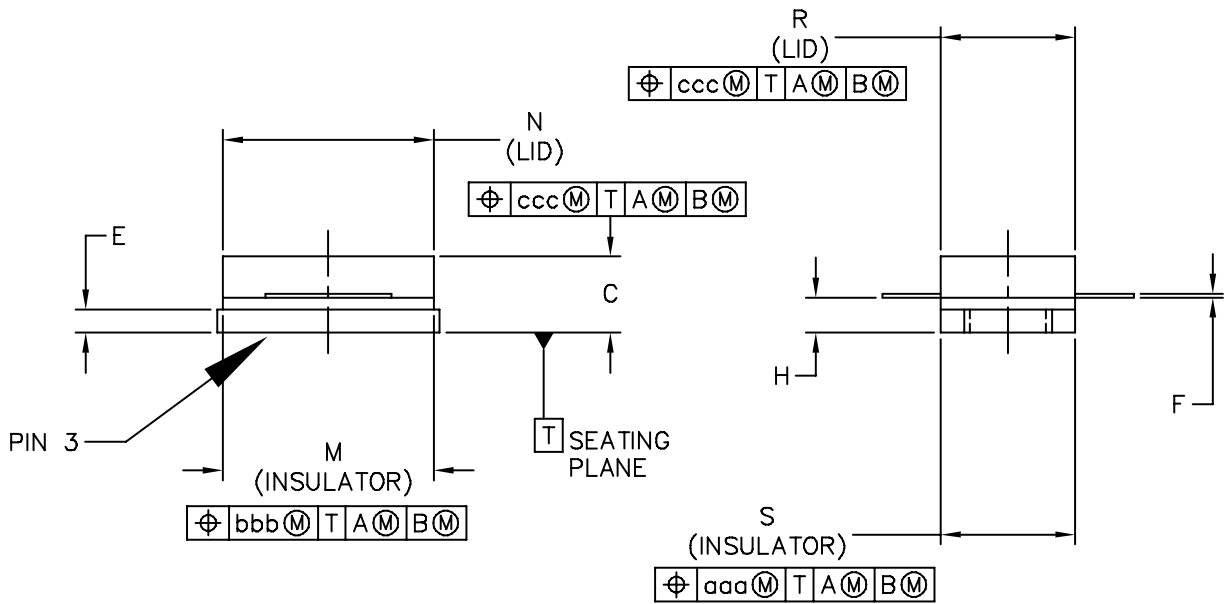
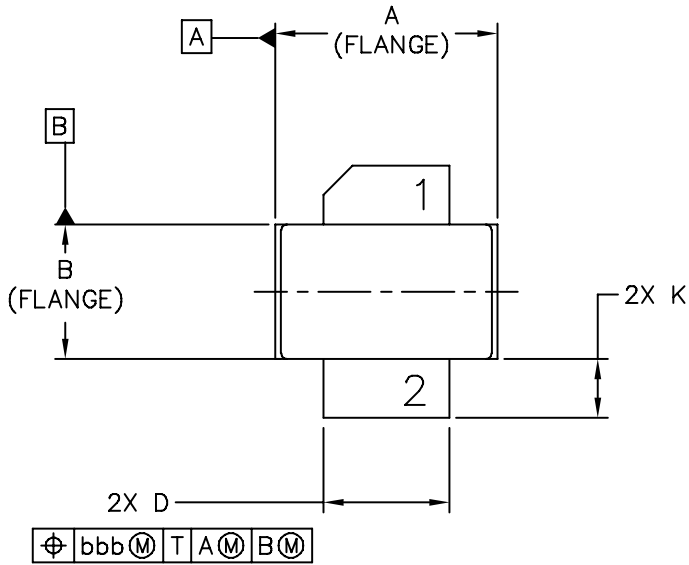
STYLE 1:

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

CASE 360B-05  
 ISSUE G  
 NI-360  
 MRF373ALR1

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TITLE:  NI-360S SURFACE MOUNT		DOCUMENT NO: 98ASB14516C		REV: F	
		CASE NUMBER: 360C-05		10 MAR 2006	
		STANDARD: NON-JEDEC			

NOTES:

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STYLE 1:

- PIN 1 - DRAIN
- 2 - GATE
- 3 - SOURCE

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DIM	INCH		MILLIMETER		DIM	INCH		MILLIMETER	
	MIN	MAX	MIN	MAX		MIN	MAX	MIN	MAX
A	.375	.385	9.53	9.78	N	.357	.363	9.07	9.22
B	.225	.235	5.72	5.97	R	.227	.233	5.77	5.92
C	.105	.155	2.67	3.94	S	.225	.235	5.72	5.97
D	.210	.220	5.33	5.59					
E	.035	.045	0.89	1.14	aaa	.005		0.13	
F	.004	.006	0.1	0.15	bbb	.010		0.25	
H	.057	.067	1.45	1.7	ccc	.015		0.38	
K	.085	.115	2.16	2.92					
M	.355	.365	9.02	9.27					

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		CASE NUMBER: 360C-05		10 MAR 2006	
		STANDARD: NON-JEDEC			

**PRODUCT DOCUMENTATION**

Refer to the following documents to aid your design process.

**Engineering Bulletins**

- EB212: Using Data Sheet Impedances for RF LDMOS Devices

**REVISION HISTORY**

The following table summarizes revisions to this document.

Revision	Date	Description
7	Sept. 2008	<ul style="list-style-type: none"> <li>• Replaced Case Outline 360C-05, Issue E with Issue F, p. 7-8.</li> <li>• Added Product Documentation and Revision History, p. 9</li> </ul>

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