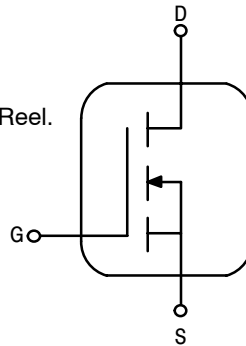


**The RF MOSFET Line**  
**RF Power Field Effect Transistors**  
**N-Channel Enhancement-Mode Lateral MOSFETs**

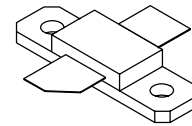
**MRF373ALR1**  
**MRF373ALSR1**

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.

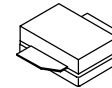
- Typical CW Performance at 860 MHz, 32 Volts, Narrowband Fixture  
 Output Power — 75 Watts  
 Power Gain — 18.2 dB  
 Efficiency — 60%
- 100% Tested for Load Mismatch Stress at All Phase Angles with 10:1 VSWR @ 32 Vdc, 860 MHz, 75 Watts CW
- Integrated ESD Protection
- Excellent Thermal Stability
- Characterized with Series Equivalent Large-Signal Impedance Parameters
- In Tape and Reel. R1 = 500 units per 32 mm, 13 inch Reel.
- Low Gold Plating Thickness on Leads.  
 L Suffix Indicates 40μ" Nominal.



**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**

**MAXIMUM RATINGS**

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

**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	MRF373ALR1	0.89
		MRF373ALSR1	0.63

**ESD PROTECTION CHARACTERISTICS**

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

**NOTE - CAUTION** - MOS devices are susceptible to damage from electrostatic charge. Reasonable precautions in handling and packaging MOS devices should be observed.

# Freescale Semiconductor, Inc.

## ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

### OFF CHARACTERISTICS

Drain-Source Breakdown Voltage (V <sub>GS</sub> = 0 Vdc, I <sub>D</sub> = 1 μA)	V <sub>(BR)DSS</sub>	70	—	—	Vdc
Zero Gate Voltage Drain Current (V <sub>DS</sub> = 32 Vdc, V <sub>GS</sub> = 0 Vdc)	I <sub>DSS</sub>	—	—	1	μAdc
Gate-Source Leakage Current (V <sub>GS</sub> = 5 Vdc, V <sub>DS</sub> = 0 Vdc)	I <sub>GSS</sub>	—	—	1	μAdc

### ON CHARACTERISTICS

Gate Threshold Voltage (V <sub>DS</sub> = 10 V, I <sub>D</sub> = 200 μA)	V <sub>GS(th)</sub>	2	2.9	4	Vdc
Gate Quiescent Voltage (V <sub>DS</sub> = 32 V, I <sub>D</sub> = 100 mA)	V <sub>GS(Q)</sub>	2.5	3.3	4.5	Vdc
Drain-Source On-Voltage (V <sub>GS</sub> = 10 V, I <sub>D</sub> = 3 A)	V <sub>DS(on)</sub>	—	0.41	0.45	Vdc

### DYNAMIC CHARACTERISTICS

Input Capacitance (V <sub>DS</sub> = 32 V, V <sub>GS</sub> = 0, f = 1 MHz)	C <sub>iss</sub>	—	98.5	—	pF
Output Capacitance (V <sub>DS</sub> = 32 V, V <sub>GS</sub> = 0, f = 1 MHz)	C <sub>oss</sub>	—	49	—	pF
Reverse Transfer Capacitance (V <sub>DS</sub> = 32 V, V <sub>GS</sub> = 0, f = 1 MHz)	C <sub>rss</sub>	—	2	—	pF

### FUNCTIONAL CHARACTERISTICS (50 ohm system)

Common Source Power Gain (V <sub>DD</sub> = 32 V, P <sub>out</sub> = 75 W CW, I <sub>DQ</sub> = 200 mA, f = 860 MHz)	G <sub>ps</sub>	16.5	18.2	—	dB
Drain Efficiency (V <sub>DD</sub> = 32 V, P <sub>out</sub> = 75 W CW, I <sub>DQ</sub> = 200 mA, f = 860 MHz)	η	56	60	—	%
Load Mismatch (V <sub>DD</sub> = 32 V, P <sub>out</sub> = 75 W CW, I <sub>DQ</sub> = 200 mA, f = 860 MHz, Load VSWR at 10:1 at All Phase Angles)	ψ	No Degradation in Output Power			

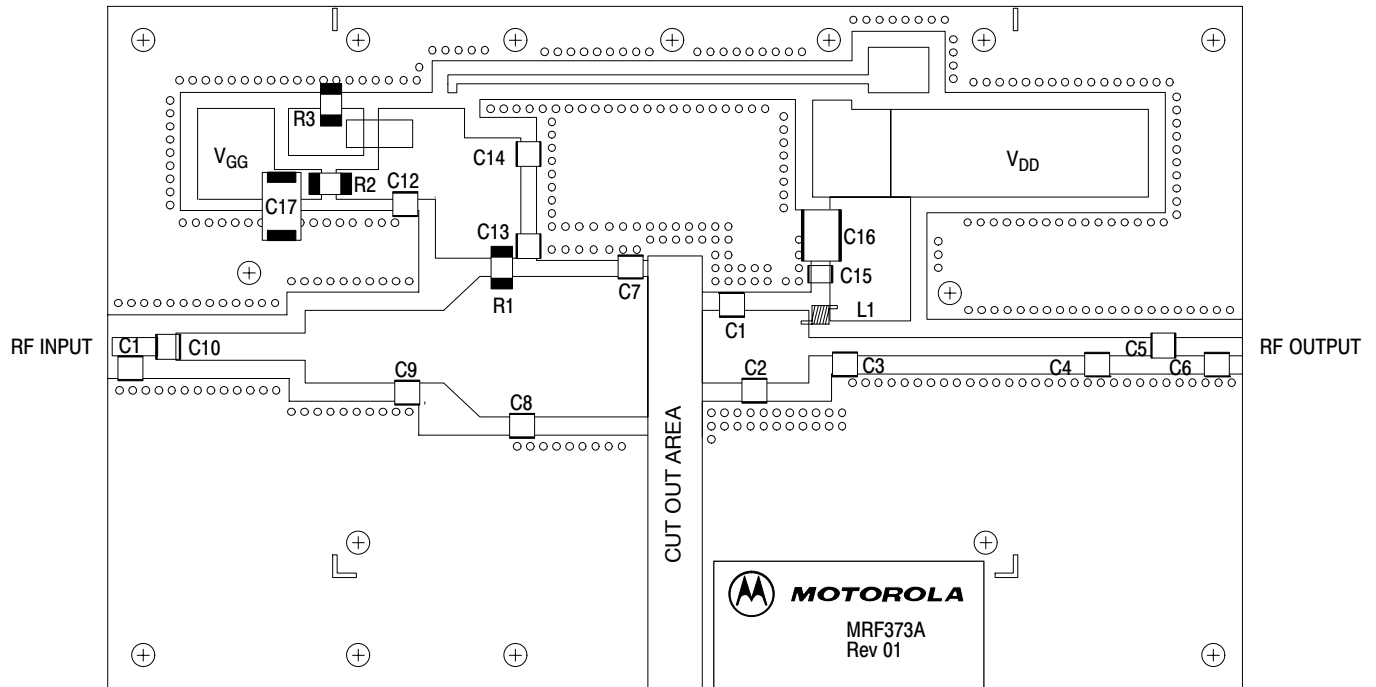


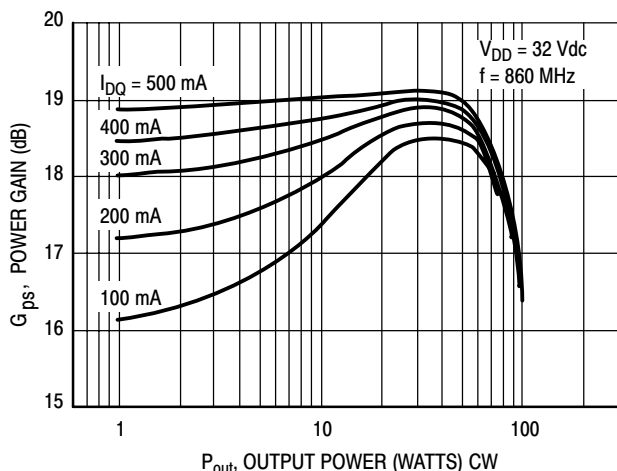
Figure 1. MRF373ALR1/ALSR1 Narrowband Test Circuit Component Layout

Table 1. MRF373ALR1/ALSR1 Narrowband Test Circuit Component Layout Designations and Values

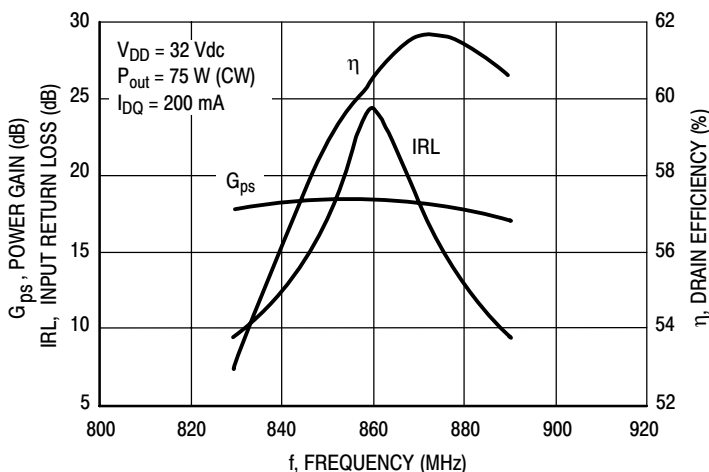
Designation	Description
C1, C2	18 pF Chip Capacitors, B Case, ATC
C3	12 pF Chip Capacitor, B Case, ATC
C4	1.8 pF Chip Capacitor, B Case, ATC
C5, C10	51 pF Chip Capacitors, B Case, ATC
C6	0.3 pF Chip Capacitor, B Case, ATC (Used only on the MRF373AS)
C7	15 pF Chip Capacitor, B Case, ATC
C8	10 pF Chip Capacitor, B Case, ATC
C9	2.7 pF Chip Capacitor, B Case, ATC
C11	0.5 pF Chip Capacitor, B Case, ATC
C12	1000 pF Chip Capacitor, B Case, ATC
C13	39 pF Chip Capacitor, B Case, ATC
C14, C15	470 pF Chip Capacitors, B Case, ATC
C16	2.2 $\mu$ F, 100 V Chip Capacitor, Vishay #VJ3640Y225KXBAT
C17	10 $\mu$ F, 35 V Tantalum Capacitor, Kemet #T491D106K35AS
L1A	12 nH, Coilcraft #A04T
R1, R2	390 $\Omega$ , 1/2 $\Omega$ Chip Resistors, Vishay Dale (2010)
R3	1 k $\Omega$ , 1/2 $\Omega$ Chip Resistor, Vishay Dale (2010)
PCB	Arlon GX-0300-55, 30 mils, $\epsilon_r = 2.55$

# Freescale Semiconductor, Inc.

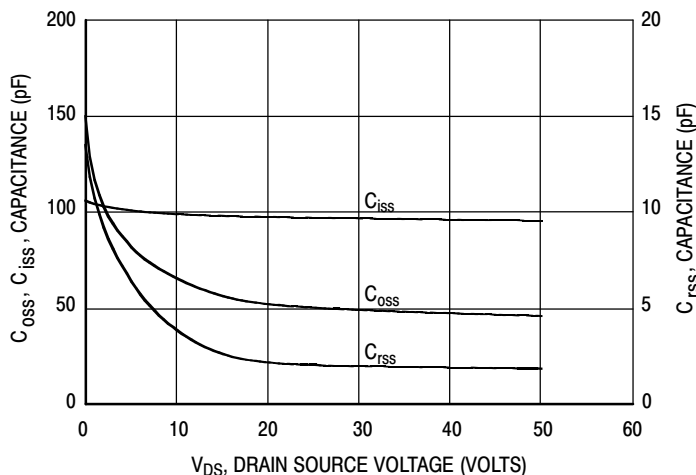
## TYPICAL CHARACTERISTICS



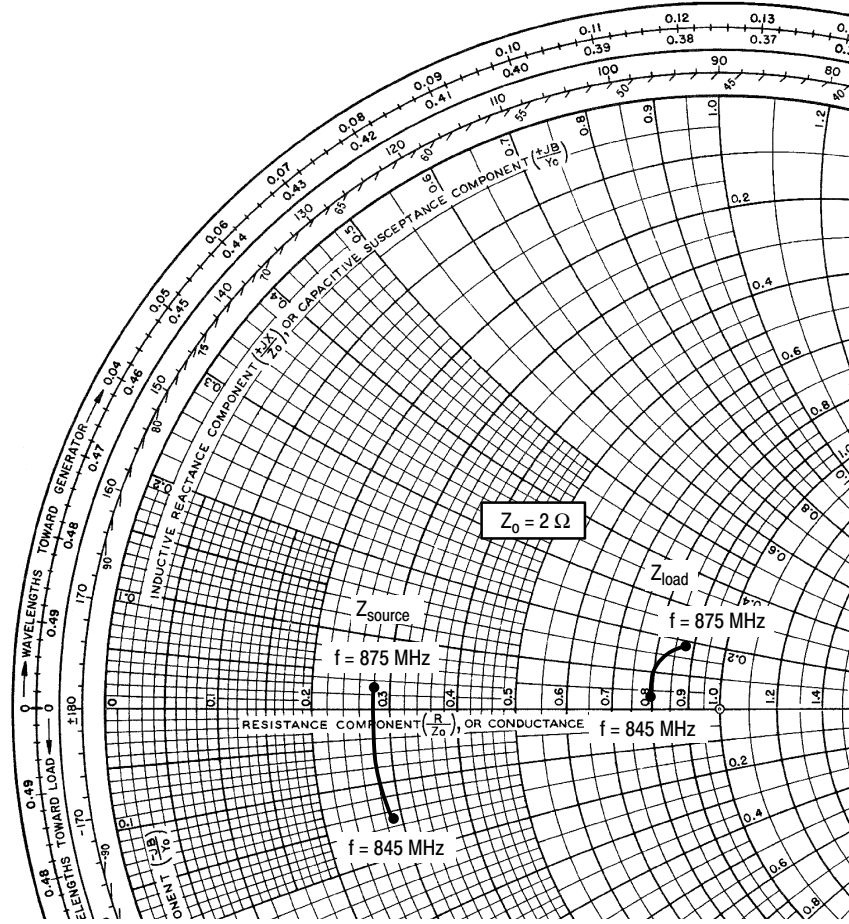
**Figure 2. Power Gain versus Output Power**



**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.

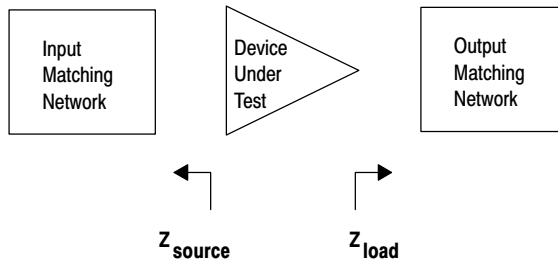


Figure 5. Series Equivalent Input and Output Impedance

**NOTES**

# Freescale Semiconductor, Inc.

## PACKAGE DIMENSIONS

**2X  $\varnothing$  Q**  
 $\oplus \varnothing$  aaa (M) T A (M) B (M)

**B**  
**B (FLANGE)**

**G**

**1**

**2**

**2X D**

**2X K**

$\oplus$  bbb (M) T A (M) B (M)

**R (LID)**  
 $\oplus$  ccc (M) T A (M) B (M)

**H**

**F**

**S (INSULATOR)**  
 $\oplus$  aaa (M) T A (M) B (M)

**E**

**N (LID)**  
 $\oplus$  ccc (M) T A (M) B (M)

**C**

**T SEATING PLANE**

**M (INSULATOR)**  
 $\oplus$  bbb (M) T A (M) B (M)

**A**

**A**

**CASE 360B-05  
 ISSUE F  
 NI-360  
 MRF373ALR1**

**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

**A**  
**A (FLANGE)**

**B**  
**B (FLANGE)**

**2X D**

**2X K**

$\oplus$  bbb (M) T A (M) B (M)

**R (LID)**  
 $\oplus$  ccc (M) T A (M) B (M)

**H**

**F**

**S (INSULATOR)**  
 $\oplus$  aaa (M) T A (M) B (M)

**E**

**N (LID)**  
 $\oplus$  ccc (M) T A (M) B (M)

**C**

**T SEATING PLANE**

**M (INSULATOR)**  
 $\oplus$  bbb (M) T A (M) B (M)

**PIN 3**

**CASE 360C-05  
 ISSUE D  
 NI-360S  
 MRF373ALSR1**

**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	0.375	0.385	9.53	9.78
B	0.225	0.235	5.72	5.97
C	0.105	0.155	2.67	3.94
D	0.210	0.220	5.33	5.59
E	0.035	0.045	0.89	1.14
F	0.004	0.006	0.10	0.15
H	0.057	0.067	1.45	1.70
K	0.085	0.115	2.16	2.92
M	0.355	0.365	9.02	9.27
N	0.357	0.363	9.07	9.22
R	0.227	0.23	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

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