

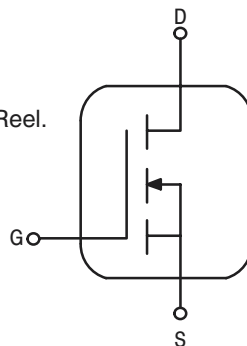
The RF MOSFET Line

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.

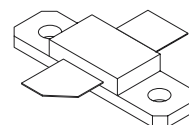
- Typical CW Performance at 860 MHz, 32 Volts, Narrowband Fixture
Output Power — 75 Watts
Power Gain — 18.2 dB
Efficiency — 60%
- 100% Tested for Load Mismatch Stress at All Phase Angles with 10:1 VSWR @ 32 Vdc, 860 MHz, 75 Watts CW
- Integrated ESD Protection
- Excellent Thermal Stability
- Characterized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



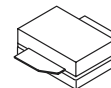
MRF373AR1

MRF373ASR1

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



CASE 360B-05, STYLE 1
NI-360
MRF373AR1



CASE 360C-05, STYLE 1
NI-360S
MRF373ASR1

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°C	P_D	197 1.12 278 1.59	Watts W/ $^\circ\text{C}$ Watts W/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	- 65 to +150	$^\circ\text{C}$
Operating Junction Temperature	T_J	200	$^\circ\text{C}$

ESD PROTECTION CHARACTERISTICS

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

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.89 0.63	$^\circ\text{C/W}$

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

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain–Source Breakdown Voltage ($V_{GS} = 0\text{ Vdc}$, $I_D = 1\text{ }\mu\text{A}$)	$V_{(BR)DSS}$	70	—	—	Vdc
Zero Gate Voltage Drain Current ($V_{DS} = 32\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$)	I_{DSS}	—	—	1	μAdc
Gate–Source Leakage Current ($V_{GS} = 5\text{ Vdc}$, $V_{DS} = 0\text{ Vdc}$)	I_{GSS}	—	—	1	μAdc
ON CHARACTERISTICS					
Gate Threshold Voltage ($V_{DS} = 10\text{ V}$, $I_D = 200\text{ }\mu\text{A}$)	$V_{GS(th)}$	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
DYNAMIC CHARACTERISTICS					
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
FUNCTIONAL CHARACTERISTICS (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 ($V_{DD} = 32\text{ V}$, $P_{out} = 75\text{ W CW}$, $I_{DQ} = 200\text{ mA}$, $f = 860\text{ MHz}$)	η	56	60	—	%
Load Mismatch ($V_{DD} = 32\text{ V}$, $P_{out} = 75\text{ W CW}$, $I_{DQ} = 200\text{ mA}$, $f = 860\text{ MHz}$, Load VSWR at 10:1 at All Phase Angles)	ψ	No Degradation in Output Power			

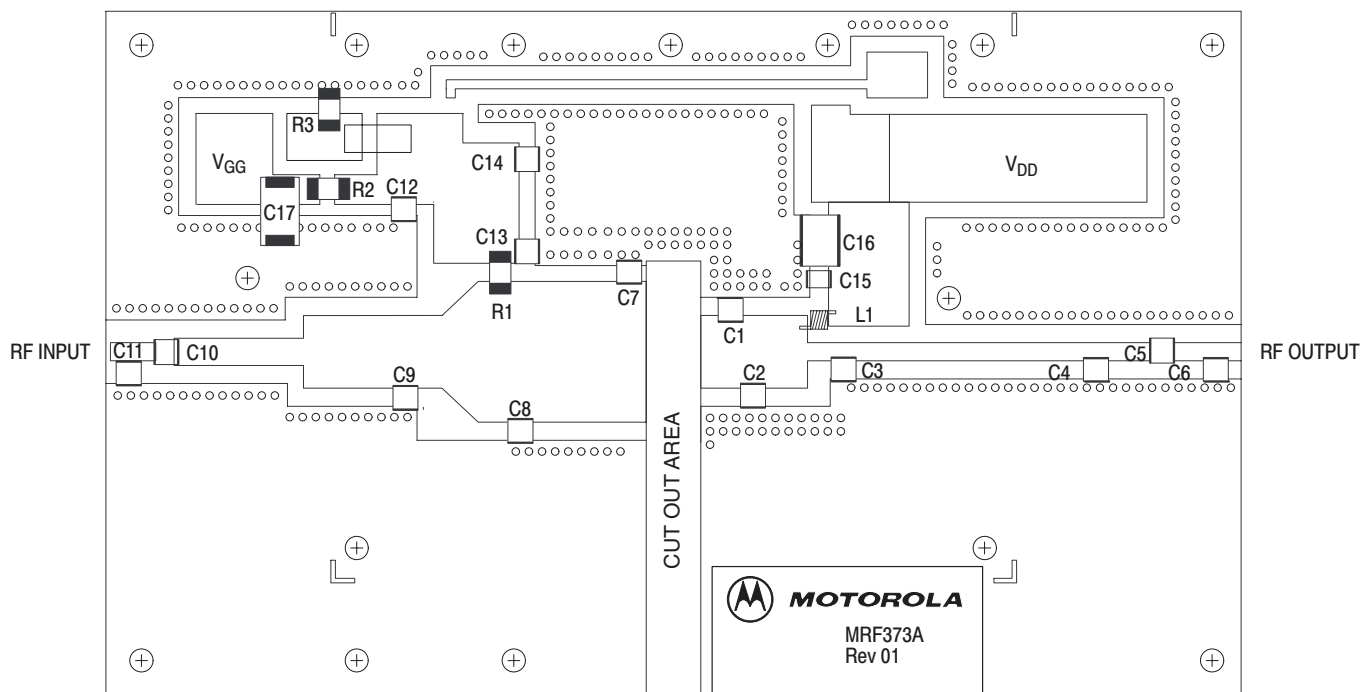


Figure 1. MRF373AR1/ASR1 Narrowband Test Circuit Component Layout

Table 1. MRF373AR1/ASR1 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 μ F, 100 V Chip Capacitor, Vishay #VJ3640Y225KXBAT
C17	10 μ F, 35 V Tantalum Capacitor, Kemet #T491D106K35AS
L1A	12 nH, Coilcraft #A04T
R1, R2	390 Ω , 1/2 Ω Chip Resistors, Vishay Dale (2010)
R3	1 k Ω , 1/2 Ω Chip Resistor, Vishay Dale (2010)
PCB	MRF373 Printed Circuit Board Rev 01, CuClad 250 (GX-0300-55), Height 30 mils, $\epsilon_r = 2.55$

TYPICAL CHARACTERISTICS

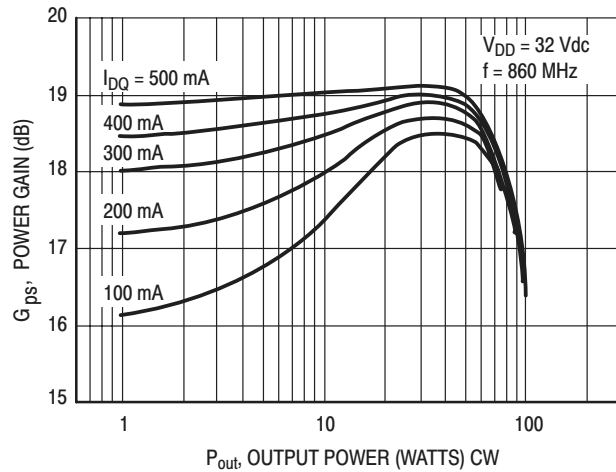


Figure 2. Power Gain versus Output Power

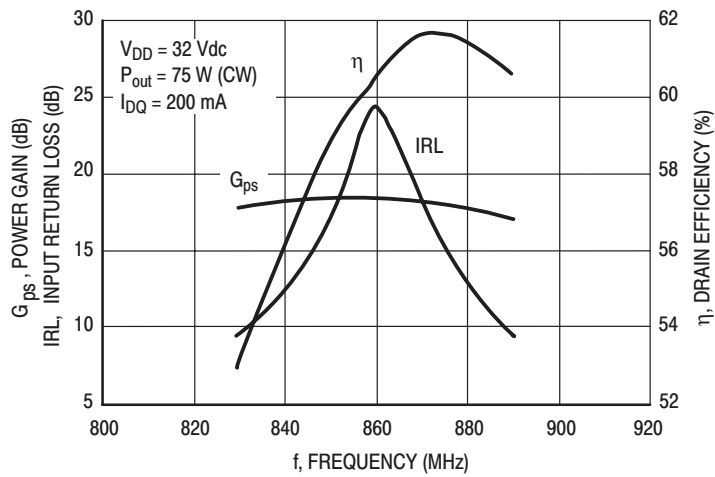


Figure 3. Performance in Narrowband Circuit

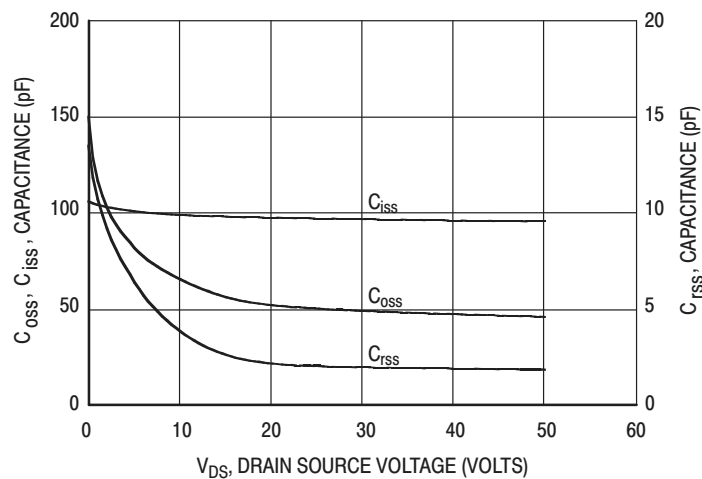
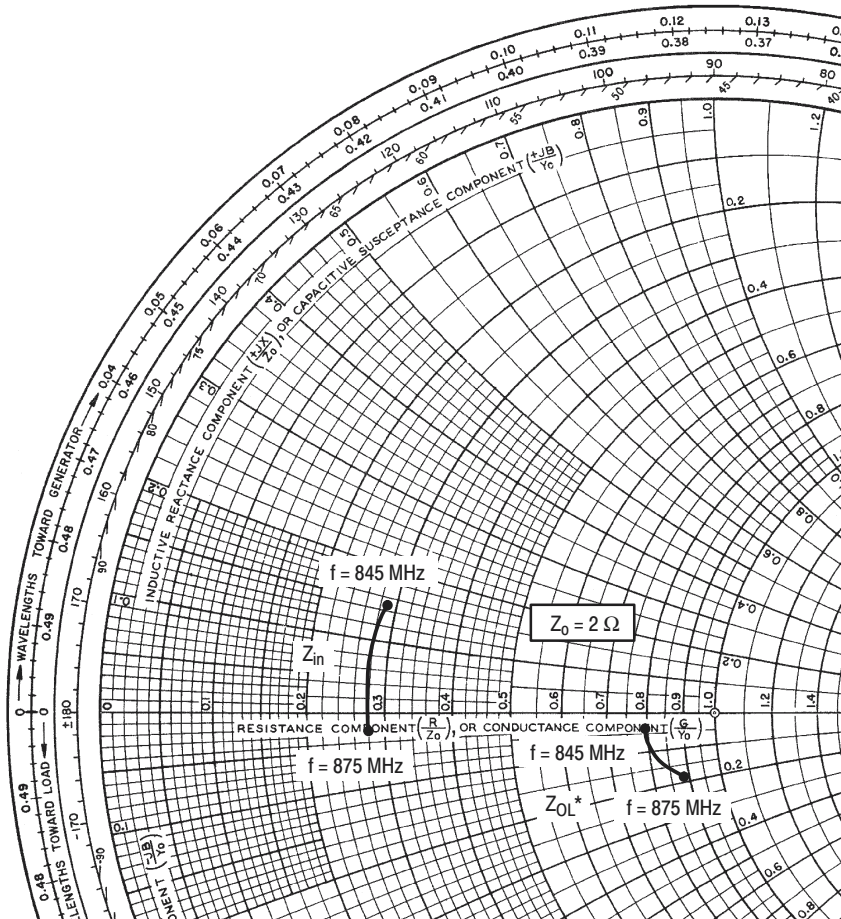


Figure 4. Capacitance versus Voltage



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

f MHz	Z_{in} Ω	Z_{OL}^* Ω
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_{in} = Complex conjugate of the source impedance.

Z_{OL}^* = Complex conjugate of the optimum load impedance at a given output power, voltage, IMD, bias current and frequency.

Note: Z_{OL}^* was chosen based on tradeoffs between gain, output power, drain efficiency and intermodulation distortion.

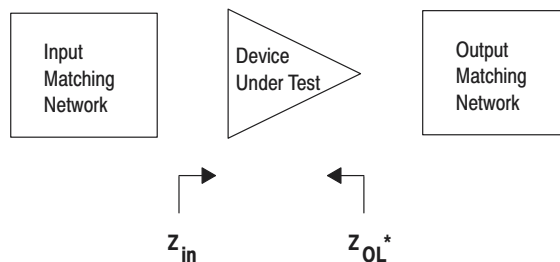
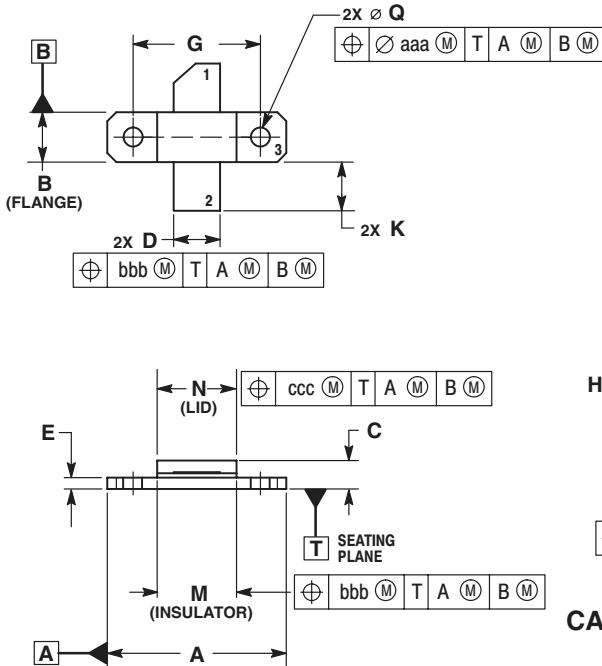


Figure 5. Series Equivalent Input and Output Impedance

NOTES

PACKAGE DIMENSIONS



NOTES:

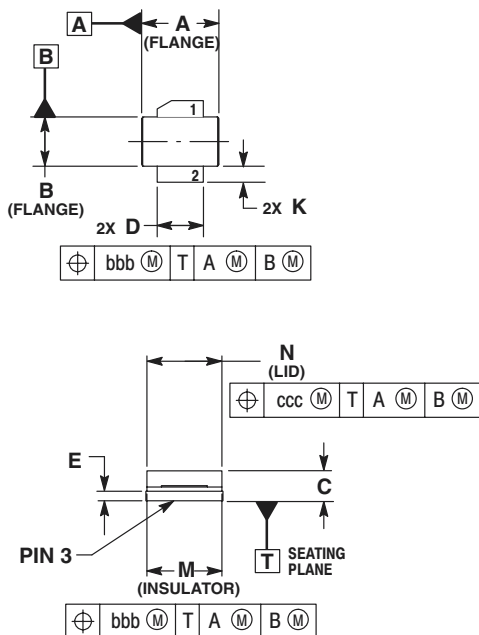
1. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION H IS MEASURED 0.030 (0.762) AWAY FROM PACKAGE BODY.

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
- GATE
- SOURCE

**CASE 360B-05
ISSUE F
NI-360
MRF373AR1**



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
- GATE
- SOURCE

**CASE 360C-05
ISSUE D
NI-360S
MRF373ASR1**

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MRF373A/D