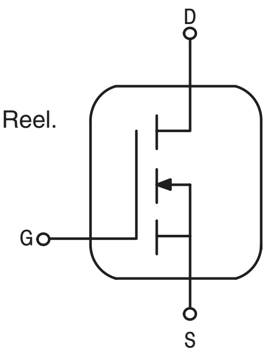
The RF MOSFET Line
RF Power Field Effect Transistors
N–Channel Enhancement–Mode Lateral MOSFETs

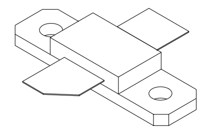
MRF373AR1
MRF373ASR1

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.

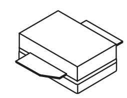
- Typical CW Performance at 860 MHz, 32 Volts, Narrowband Fixture
  Output Power — 75 Watts
  Power Gain — 18.2 dB
  Efficiency — 60%
- 100% Tested for Load Mismatch Stress at All Phase Angles with 10:1 VSWR @ 32 Vdc, 860 MHz, 75 Watts CW
- Integrated ESD Protection
- Excellent Thermal Stability
- Characterized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



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°C Derate above 25°C	MRF373AR1 MRF373ASR1	P_D	197 1.12 278 1.59	Watts W/°C Watts W/°C
Storage Temperature Range		T_{stg}	– 65 to +150	°C
Operating Junction Temperature		T_J	200	°C

ESD PROTECTION CHARACTERISTICS

Test Conditions		Class
Human Body Model		1 (Minimum)
Machine Model	MRF373AR1 MRF373ASR1	M2 (Minimum) M1 (Minimum)

THERMAL CHARACTERISTICS

Characteristic		Symbol	Max	Unit
Thermal Resistance, Junction to Case	MRF373AR1 MRF373ASR1	$R_{\theta JC}$	0.89 0.63	°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°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain–Source Breakdown Voltage (V_{GS} = 0 Vdc, I_D =1 μA)	$V_{(BR)DSS}$	70	—	—	Vdc
Zero Gate Voltage Drain Current (V_{DS} = 32 Vdc, V_{GS} = 0 Vdc)	I_{DSS}	—	—	1	μAdc
Gate–Source Leakage Current (V_{GS} = 5 Vdc, V_{DS} = 0 Vdc)	I_{GSS}	—	—	1	μAdc
ON CHARACTERISTICS					
Gate Threshold Voltage (V_{DS} = 10 V, I_D = 200 μA)	$V_{GS(th)}$	2	2.9	4	Vdc
Gate Quiescent Voltage (V_{DS} = 32 V, I_D = 100 mA)	$V_{GS(Q)}$	2.5	3.3	4.5	Vdc
Drain–Source On–Voltage (V_{GS} = 10 V, I_D = 3 A)	$V_{DS(on)}$	—	0.41	0.45	Vdc
DYNAMIC CHARACTERISTICS					
Input Capacitance (V_{DS} = 32 V, V_{GS} = 0, f = 1 MHz)	C_{iss}	—	98.5	—	pF
Output Capacitance (V_{DS} = 32 V, V_{GS} = 0, f = 1 MHz)	C_{oss}	—	49	—	pF
Reverse Transfer Capacitance (V_{DS} = 32 V, V_{GS} = 0, f = 1 MHz)	C_{rss}	—	2	—	pF
FUNCTIONAL CHARACTERISTICS (50 ohm system)					
Common Source Power Gain (V_{DD} = 32 V, P_{out} = 75 W CW, I_{DQ} = 200 mA, f = 860 MHz)	G_{ps}	16.5	18.2	—	dB
Drain Efficiency (V_{DD} = 32 V, P_{out} = 75 W CW, I_{DQ} = 200 mA, f = 860 MHz)	η	56	60	—	%
Load Mismatch (V_{DD} = 32 V, P_{out} = 75 W CW, I_{DQ} = 200 mA, f = 860 MHz, Load VSWR at 10:1 at All Phase Angles)	ψ	No Degradation in Output Power			

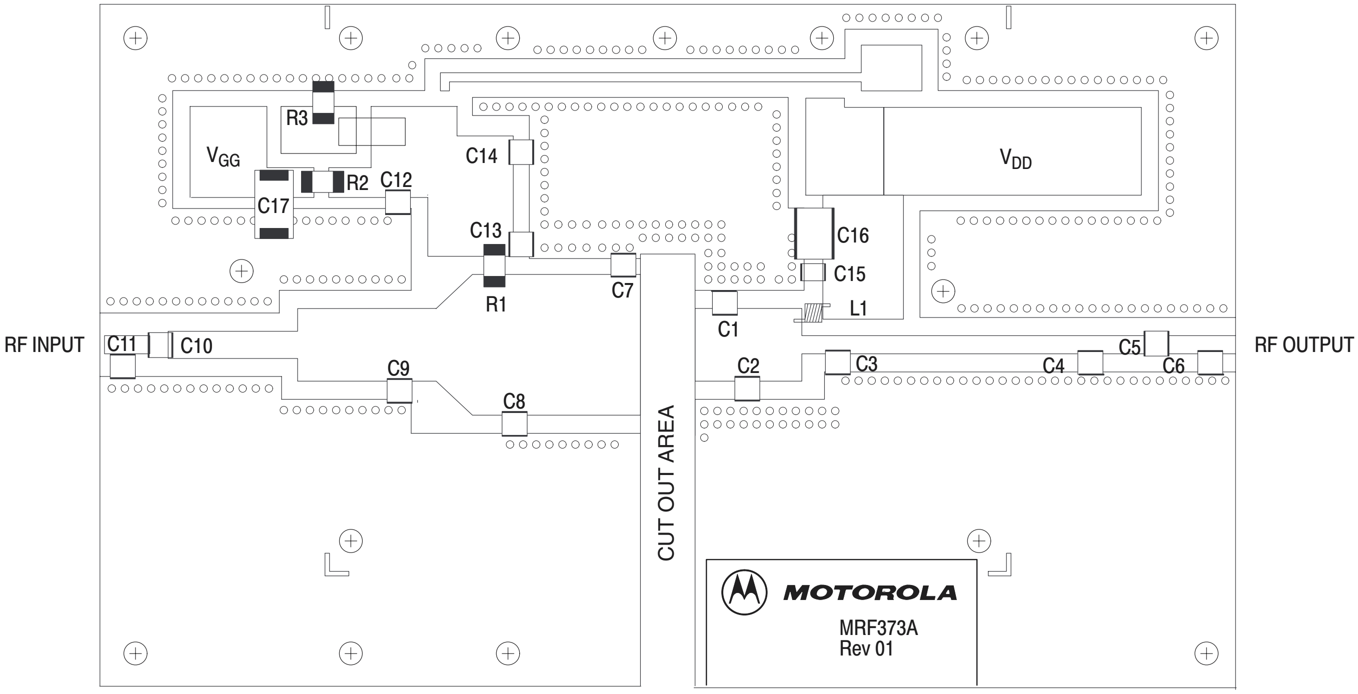


Figure 1. MRF373AR1/ASR1 Narrowband Test Circuit Component Layout

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 μF, 100 V Chip Capacitor, Vishay #VJ3640Y225KXBAT
C17	10 μF, 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 kΩ, 1/2 Ω Chip Resistor, Vishay Dale (2010)
PCB	MRF373 Printed Circuit Board Rev 01, CuClad 250 (GX–0300–55), Height 30 mils, ε_r = 2.55

TYPICAL CHARACTERISTICS

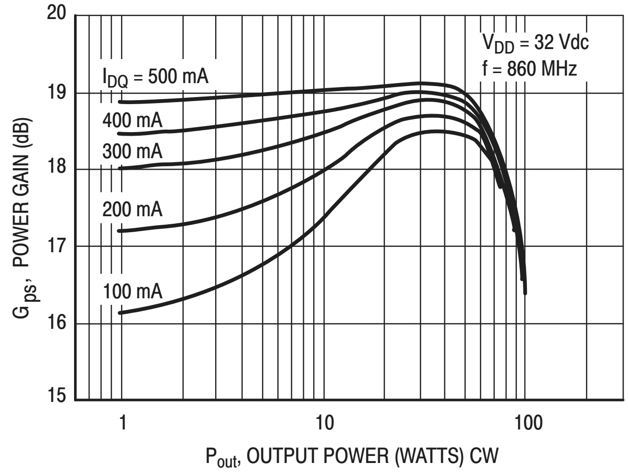


Figure 2. Power Gain versus Output Power

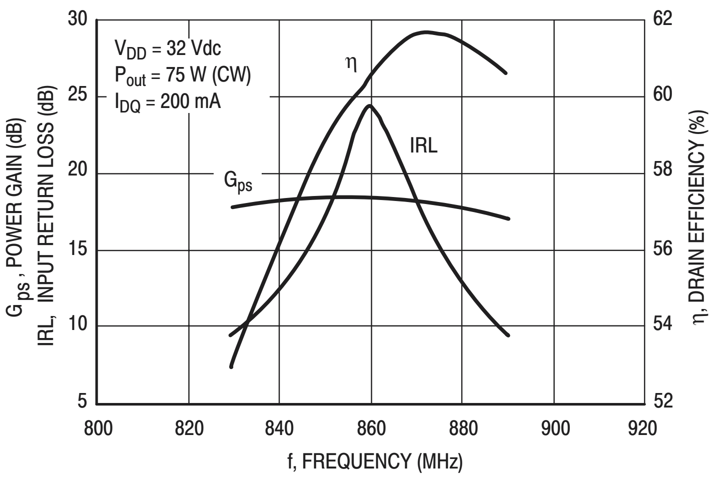


Figure 3. Performance in Narrowband Circuit

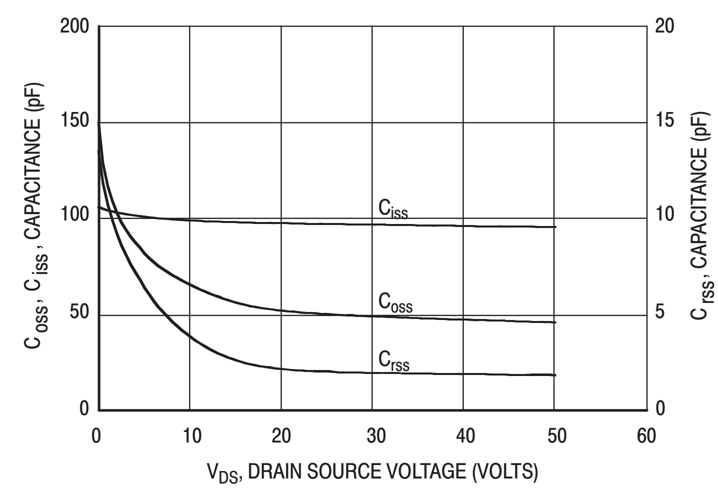
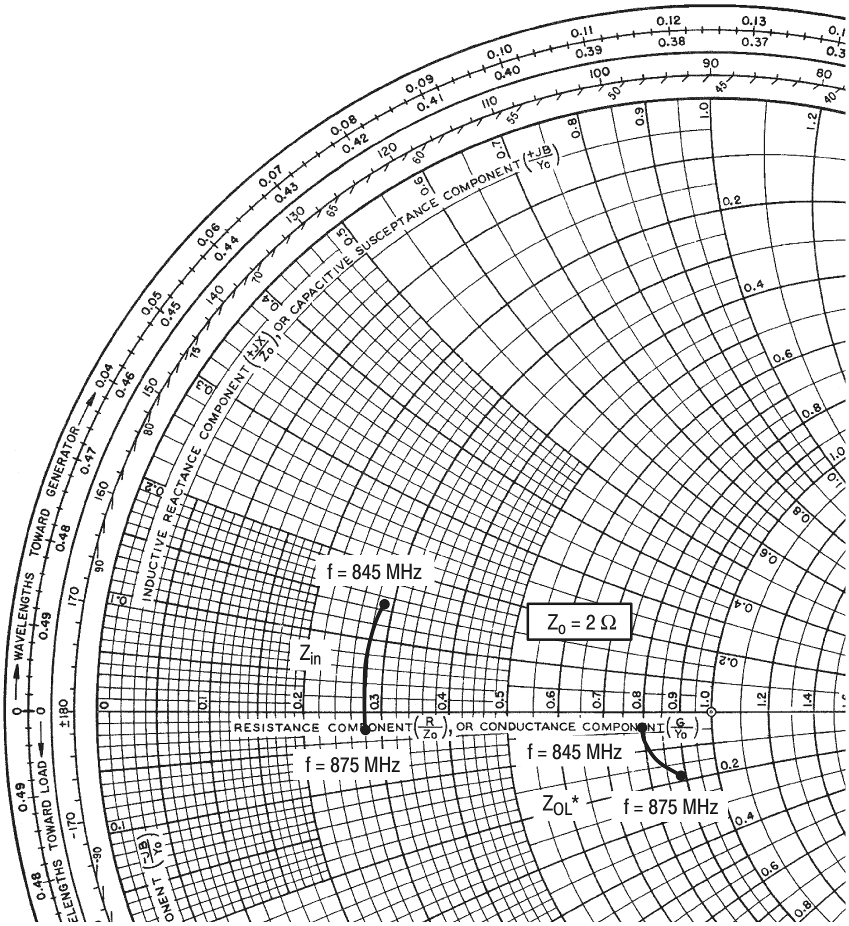


Figure 4. Capacitance versus Voltage



V_{DD} = 32 V, I_{DQ} = 200 mA, P_{out} = 75 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.

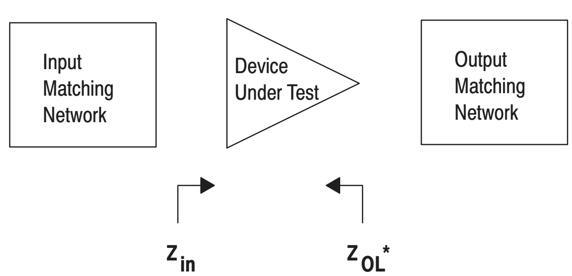
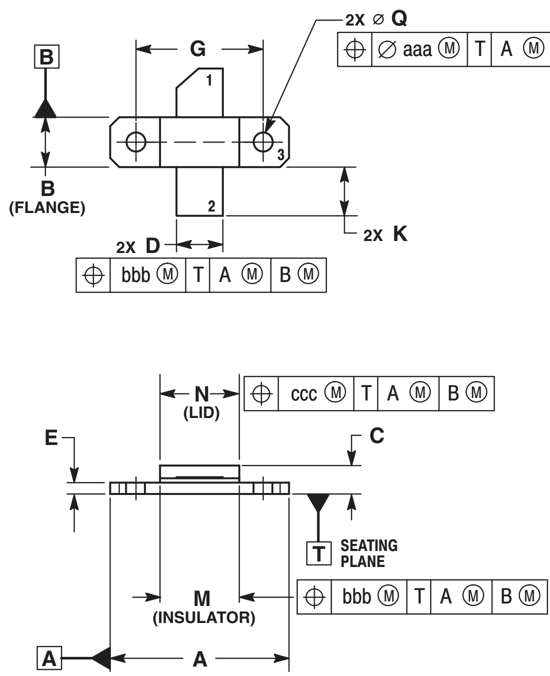
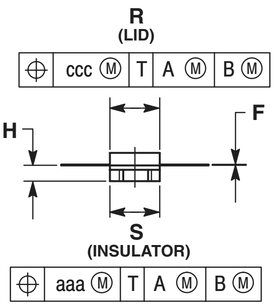


Figure 5. Series Equivalent Input and Output Impedance

NOTES

PACKAGE DIMENSIONS



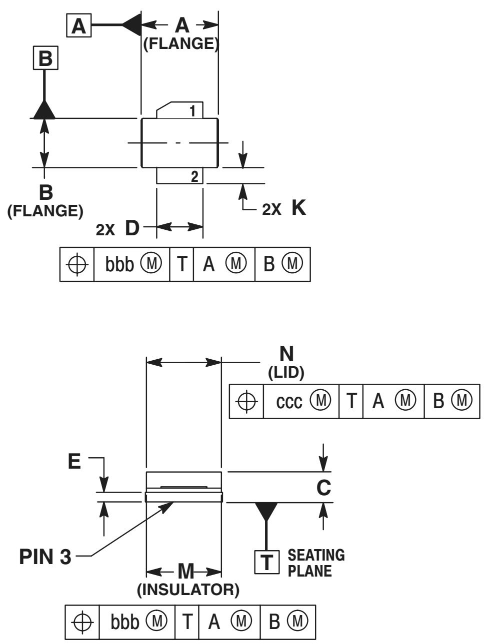


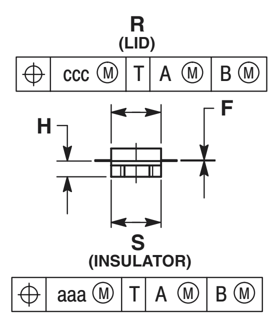
NOTES:
1. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M–1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION H IS MEASURED 0.030 (0.762) AWAY FROM PACKAGE BODY.

	INCHES		MILLIMETERS	
DIM	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 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.

	INCHES		MILLIMETERS	
DIM	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

CASE 360C–05
ISSUE D
NI–360S
MRF373ASR1

How to reach us:
USA/EUROPE/Locations Not Listed: Motorola Literature Distribution; P.O. Box 5405, Denver, Colorado 80217. 1–303–675–2140 or 1–800–441–2447

JAPAN: Motorola Japan Ltd.; SPS, Technical Information Center, 3–20–1, Minami–Azabu. Minato–ku, Tokyo 106–8573 Japan. 81–3–3440–3569

ASIA/PACIFIC: Motorola Semiconductors H.K. Ltd.; Silicon Harbour Centre, 2 Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong. 852–26668334

Technical Information Center: 1–800–521–6274

HOME PAGE: http://www.motorola.com/semiconductors/