

120 Watts, 21 10-2170 MHz PUSH/PULL LATERAL MOSFET

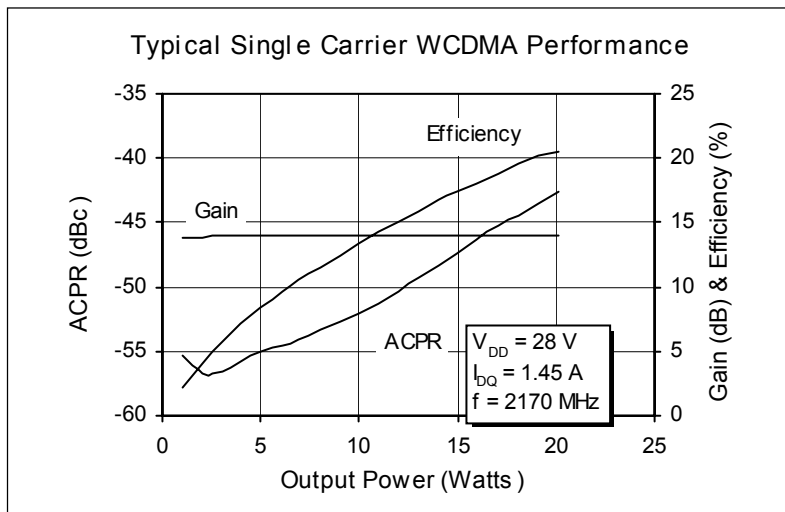
PTF102003

Description

The PTF102003 is a 120-watt, internally matched LDMOS FET intended for WCDMA applications from 2110 to 2170 MHz. This device typically operates at 48% efficiency (P-1dB) and 14 dB linear gain. Full gold metallization ensures excellent device lifetime and reliability.

Key Features

- INTERNALLY MATCHED
- Typical WCDMA Performance at 28 V
 - Average Output Power = 20 Watts
 - Gain = 14 dB
 - Efficiency = 22% (channel bandwidth 3.84 MHz, adjacent channels ± 5 MHz, peak/avg 8.5:1 at 0.01% CCD)
- Typical CW Performance at 28 V
 - Output Power at P1-dB = 120 Watts
 - Gain = 13 dB
 - Efficiency = 48%
- Full Gold Metallization
- Integrated ESD Protection; Class 1 (minimum) Human Body Model
- Excellent Thermal Stability
- Broadband Internal Matching
- Low HCI Drift
- Capable of Handling 10:1 VSWR @ 28 V , 120 Watts (CW) Output Power



Guaranteed Performance

WCDMA Measurements (in test fixture)

$V_{DD} = 28$ V, $I_{DQ} = 1.45$ A, $P_{OUT} = 20$ W AVG

$f = 2170$ MHz, Single Carrier 3GPP Channel Bandwidth 3.84 MHz, Adj Channels ± 5 MHz, Peak to Avg 8.5:1

Characteristic	Symbol	Min	Typ	Max	Units
Adjacent Channel Power Ratio	ACPR	—	-45	-40	dB
Gain	G_{ps}	13	14.5	—	dB
Drain Efficiency	η_D	19	22	—	%

Two-Tone Measurements (in test fixture)

$V_{DD} = 28$ V, $I_{DQ} = 1.20$ A, $P_{OUT} = 120$ W PEP, $f = 2170$ MHz, Tone Spacing = 100 kHz

Characteristic	Symbol	Min	Typ	Max	Units
Gain	G_{ps}	12.5	14	—	dB
Drain Efficiency	η_D	31	36	—	%
Intermodulation Distortion	IMD	-27	-30	—	dBc

All published data at $T_{CASE} = 25^\circ\text{C}$ unless otherwise indicated.

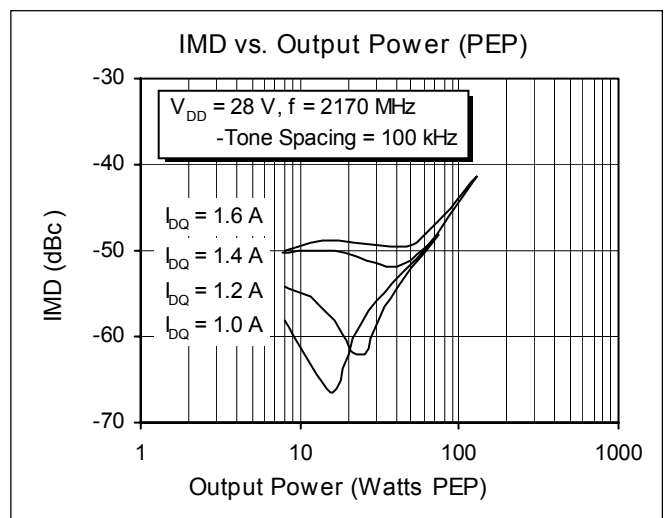
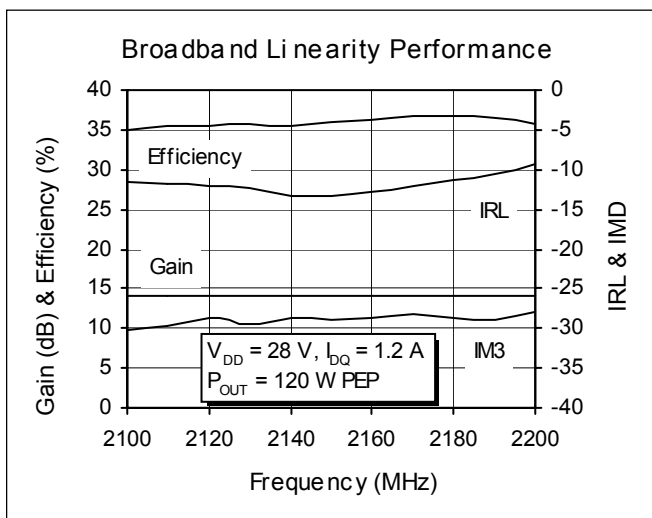
Electrical Characteristics (Guaranteed)

Characteristic	Conditions	Symbol	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_{DS} = 1\ \mu\text{A/Side}$	$V_{(BR)DSS}$	65	—	—	Volts
Drain Leakage Current	$V_{DS} = 28\text{ V}, V_{GS} = 0\text{ V/Side}$	I_{DSS}	—	—	1.0	μA
On-State Resistance	$V_{GS} = 10\text{ V}, I_{DS} = 1\text{ A/Side}$	$R_{DS(on)}$	—	0.13	—	Ohms
Quiescent Current Gate Voltage	$V_{DS} = 28\text{ V}, I_D = 700\text{ mA/Side}$	$V_{GS(Q)}$	2.5	3.4	4	Volts
Gate Leakage Current	$V_{GS} = 10\text{ V}, V_{DS} = 0\text{ V/Side}$	I_{GSS}	—	—	100	nA

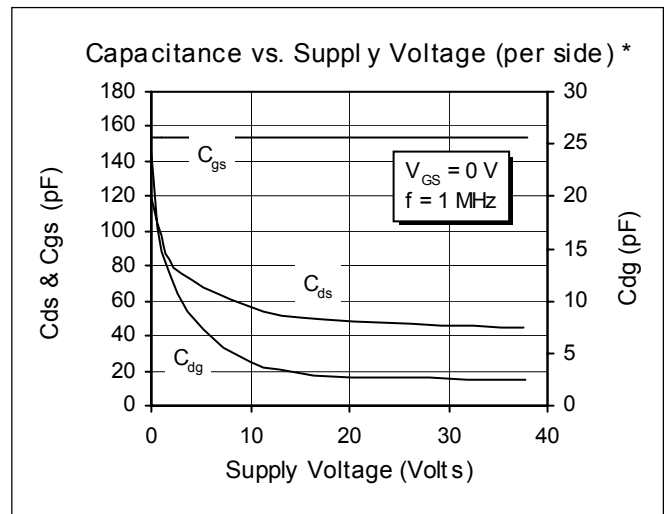
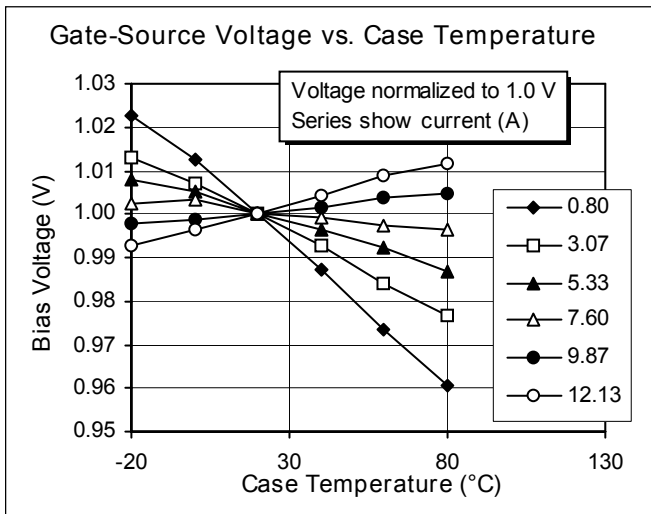
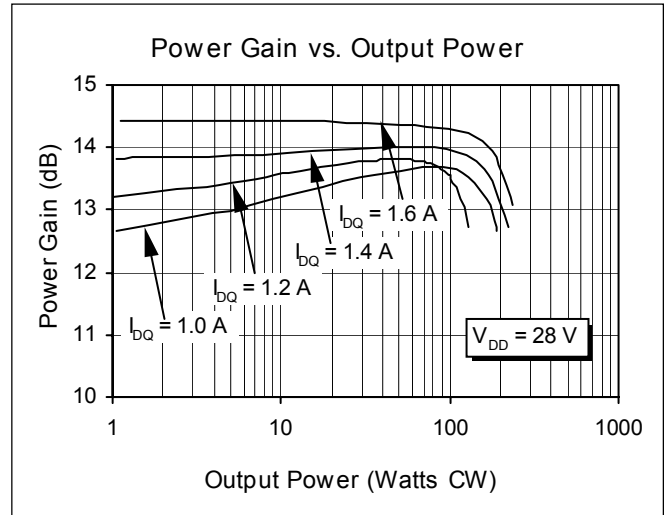
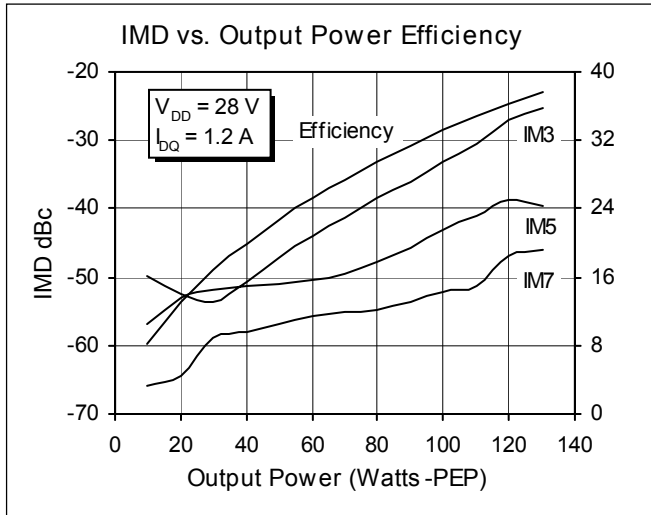
Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	Volts
Gate-Source Voltage	V_{GS}	+15, -0.5	Volts
Operating Junction Temperature	T_J	200	$^{\circ}\text{C}$
Total Device Dissipation Above 25 $^{\circ}\text{C}$ derate by	P_D	330 1.88	Watts $\text{W}/^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-40 to +150	$^{\circ}\text{C}$
Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}$)	$R_{\theta JC}$	0.55	$^{\circ}\text{C}/\text{W}$

Typical Performance



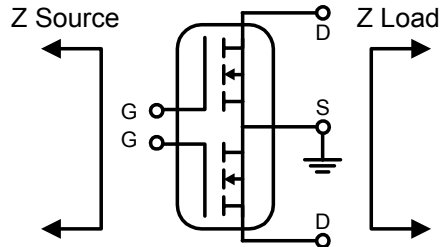
Typical Performance (cont.)



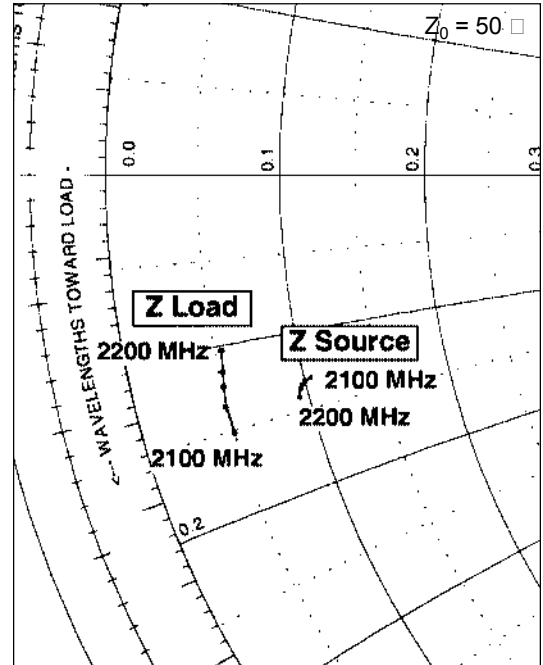
* This part is internally matched. Measurements of the finished product will not yield these results.

Broadband Circuit Impedance

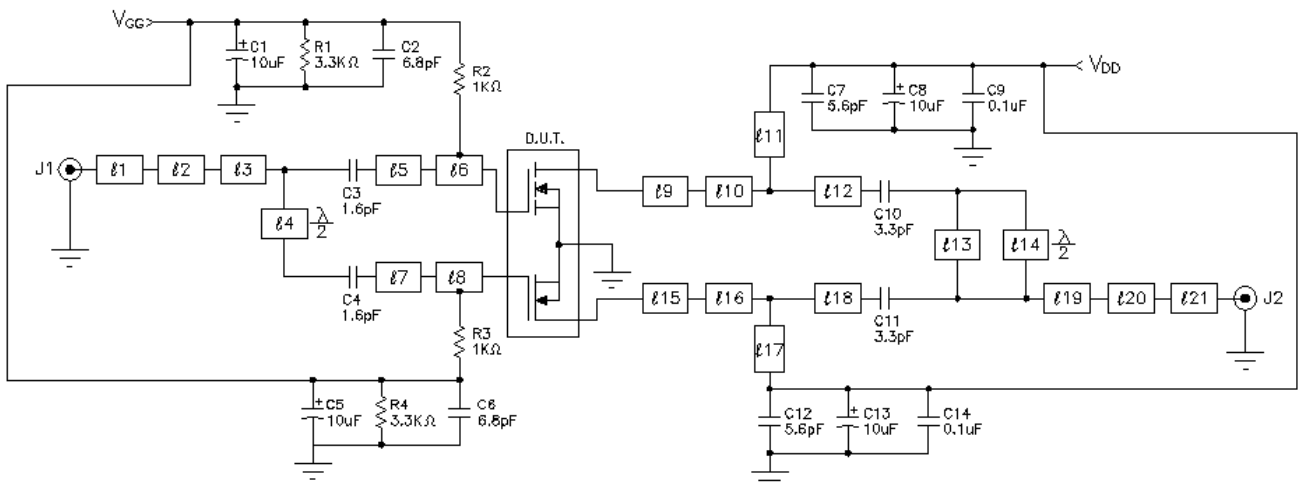
$V_{DD} = 28\text{ V}$, $I_{DQ} = 1.2\text{ A}$, $P_{out} = 20\text{ W Avg}$ 2 Tone 1 MHz Spacing



Frequency MHz	Z Source \square		Z Load \square	
	R	jX	R	jX
2100	5.2	-6.58	2.52	-7.6
2110	5.0	-6.62	2.48	-6.8
2140	4.9	-6.73	2.56	-6.2
2170	4.8	-6.85	2.62	-5.78
2200	4.7	-7.10	2.72	-5.17



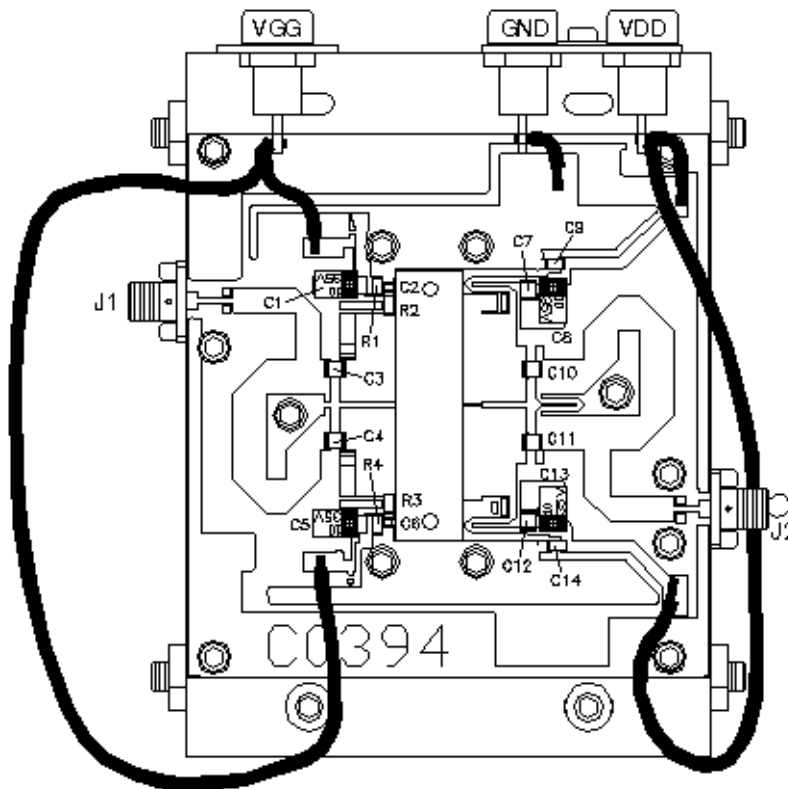
Test Circuit



Test Circuit (cont.)

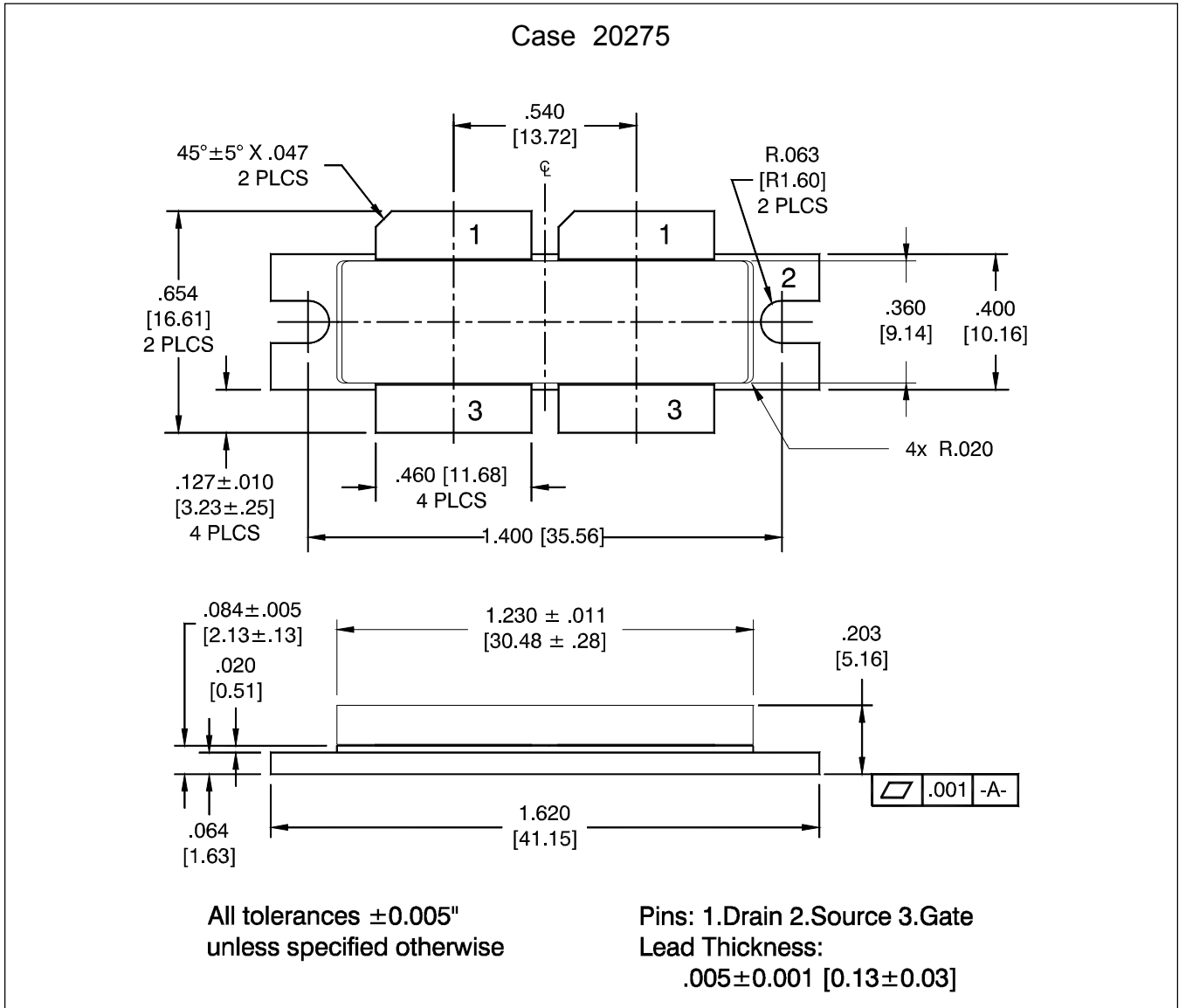
Test Circuit Schematic for 2170 MHz

DUT	PTF 102003	LDMOS Transistor	C1, C5, C8, C13	Capacitor, 10 μ F, 35 V, Tant TE Series SMD, Digi-Key PCS6106TR
1, 21	0.02 @ 2170 MHz	Microstrip 29.20	C2, C6	Capacitor, 6.8 pF, 100A 6R8
2	0.07 @ 2170 MHz	Microstrip 50	C3, C4	Capacitor, 1.6 pF, ATC 600B 1R6 BW
3	0.26 @ 2170 MHz	Microstrip 20.10	C7, C12	Capacitor, 5.6 pF, 100B 5R6
4, 14	0.50 @ 2170 MHz	Microstrip 15.50	C9, C14	Capacitor, 0.1 μ F, 50 V, Digi-Key PCC103BCT
5, 7	0.03 @ 2170 MHz	Microstrip 13.10	C10, C11	Capacitor, 3.3 pF, ATC 600B 3R3 BW
6, 8	0.08 @ 2170 MHz	Microstrip 6.80	J1, J2	Connector, SMA Female, Panel Mount
9, 15	0.04 @ 2170 MHz	Microstrip 5.50	R1, R4	Resistor, 3.3 K ohms, 1/16W 5% 0603 Digi-Key P3.3K GCT
10, 16	0.06 @ 2170 MHz	Microstrip 13.10	R2, R3	Resistor, 1 K ohms, 1/16W 5% 0603 Digi-Key P1.0K GCT
11, 17	0.26 @ 2170 MHz	Microstrip 53.60	PCB	4003, .020", 1 oz. copper both sides, 1 layer. AlliedSignal
12, 18	0.02 @ 2170 MHz	Microstrip 10.40		
13	0.42 @ 2170 MHz	Microstrip 53.60		
19	0.27 @ 2170 MHz	Microstrip 20.10		
20	0.05 @ 2170 MHz	Microstrip 50		



Assembly Diagram (not to scale)

Case Outline Specifications



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