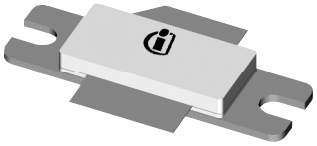
Thermally-Enhanced High Power RF LDMOS FETs
120 W, 920 – 960 MHz

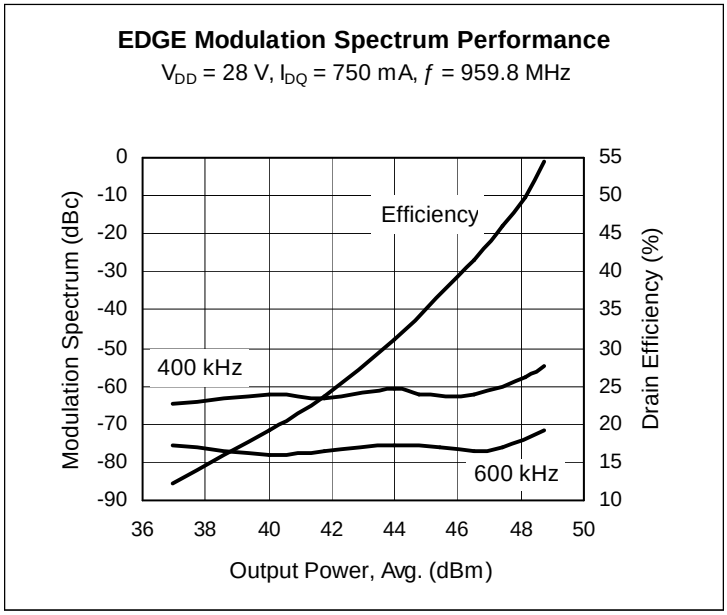
Description

The PTFA091201E and PTFA091201F are thermally-enhanced, 120-watt, internally matched *GOLDMOS*® FETs intended for ultra-linear applications. They are characaterized for GSM/EDGE and CDMA operation from 920 to 960 MHz. Thermally-enhanced packages provide the coolest operation available. Full gold metallization ensures excellent device lifetime and reliability.

PTFA091201E
Package 30248



PTFA091201F
Package 31248



Features

- Thermally-enhanced packages
- Broadband internal matching
- Typical EDGE performance
  - Average output power = 50 W
  - Gain = 19 dB
  - Efficiency = 44%
- Typical CW performance
  - Output power at P–1dB = 135 W
  - Gain = 18 dB
  - Efficiency = 64%
- Integrated ESD protection: Human Body Model, Class 2 (minimum)
- Pb-free and RoHS compliant
- Excellent thermal stability, low HCI drift
- Capable of handling 10:1 VSWR @ 28 V, 120 W (CW) output power

RF Characteristics

EDGE Measurements (not subject to production test—verified by design/characterization in Infineon test fixture)

V_{DD} = 28 V, I_{DQ} = 750 mA, P_{OUT} = 50 W, f = 959.8 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Error Vector Magnitude	EVM (RMS)	—	2.5	—	%
Modulation Spectrum @ 400 kHz	ACPR	—	–62	—	dBc
Modulation Spectrum @ 600 kHz	ACPR	—	–74	—	dBc
Gain	G_{ps}	—	19	—	dB
Drain Efficiency	η_D	—	44	—	%

All published data at T_{CASE} = 25°C unless otherwise indicated

ESD: Electrostatic discharge sensitive device—observe handling precautions!

RF Characteristics (cont.)

Two–Tone Measurements (tested in Infineon test fixture)

V_{DD} = 28 V, I_{DQ} = 750 mA, P_{OUT} = 110 W PEP, f = 960 MHz, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	18	19	—	dB
Drain Efficiency	η_D	45	48	—	%
Intermodulation Distortion	IMD	—	–31	–28	dBc

CDMA2000 3-Carrier Measurements (not subject to production test—verified by design/characterization in Infineon test fixture)

V_{DD} = 28 V, I_{DQ} = 750 mA, P_{OUT} = 35 W average, f = 960 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	19	—	dB
Drain Efficiency	η_D	—	34	—	%
Adjacent Channel Power Ratio	ACPR	—	–50	—	dBc

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_{DS} = 10 mA	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	V_{DS} = 28 V, V_{GS} = 0 V	I_{DSS}	—	—	1.0	µA
	V_{DS} = 63 V, V_{GS} = 0 V	I_{DSS}	—	—	10.0	µA
On-State Resistance	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	0.07	—	Ω
Operating Gate Voltage	V_{DS} = 28 V, I_{DQ} = 750 mA	V_{GS}	2.0	2.5	3.0	V
Gate Leakage Current	V_{GS} = 10 V, V_{DS} = 0 V	I_{GSS}	—	—	1.0	µA

Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	V
Gate-Source Voltage	V_{GS}	–0.5 to +12	V
Junction Temperature	T_J	200	°C
Total Device Dissipation	P_D	427	W
Above 25°C derate by		2.44	W/°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, 120 W CW)	$R_{\theta JC}$	0.41	°C/W

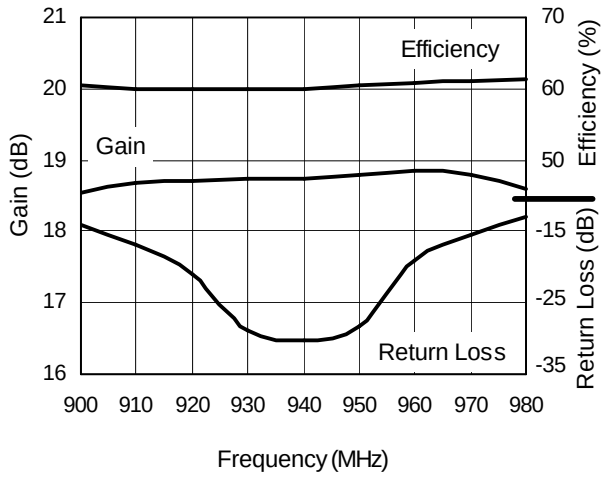
Ordering Information

Type	Package Outline	Package Description	Marking
PTFA091201E	30248	Thermally-enhanced slotted flange, single-ended	PTFA091201E
PTFA091201F	31248	Thermally-enhanced earless flange, single-ended	PTFA091201F

Typical Performance (data taken in a production test fixture)

CW Sweep in a Broadband Test Fixture

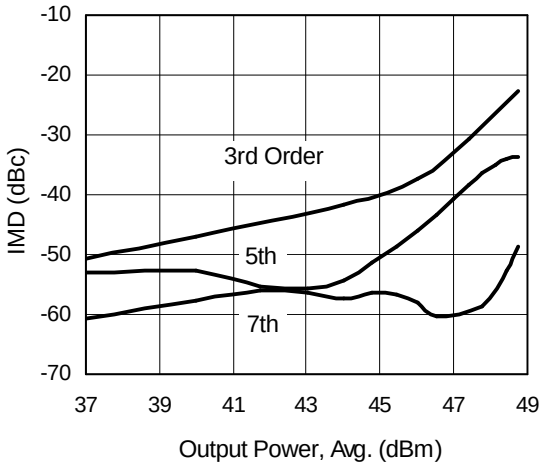
V_{DD} = 28 V, I_{DQ} = 750 mA, P_{OUT} = 50.79 dBm



Intermodulation Distortion vs. Output Power

(as measured in a broadband circuit)

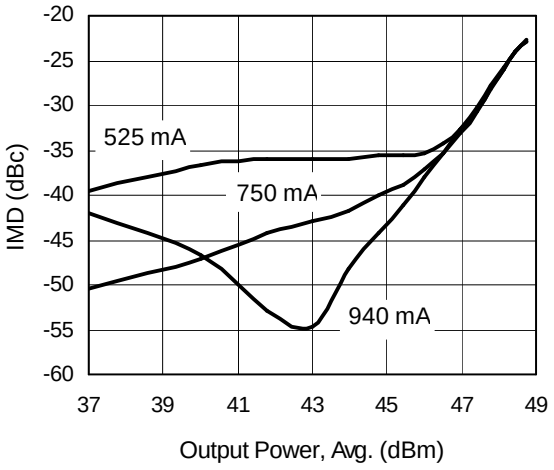
V_{DD} = 28 V, I_{DQ} = 750 mA, f_1 = 959 MHz, f_2 = 960 MHz



Typical Performance (cont.)

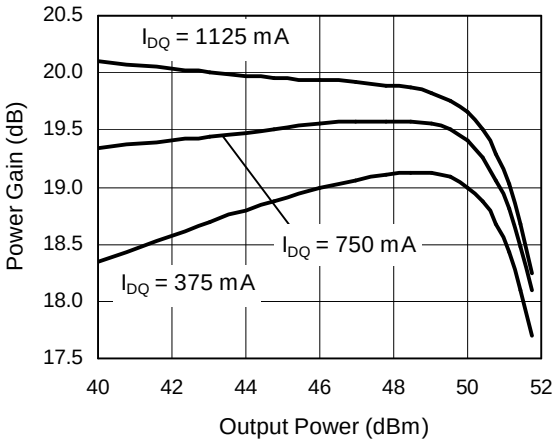
IM3 vs. Output Power at Selected Biases

V_{DD} = 28 V, f_1 = 959, f_2 = 960 MHz,
series show I_{DQ}



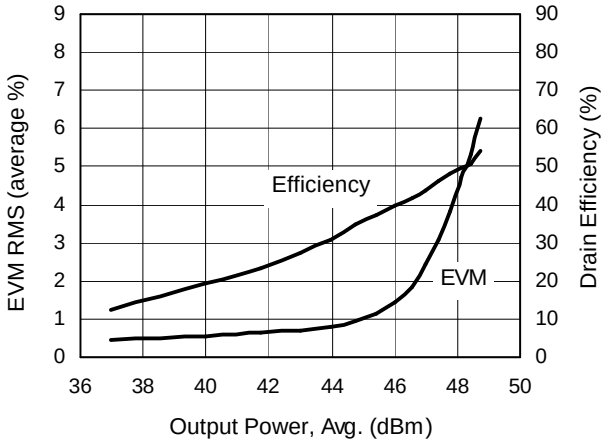
Power Sweep

V_{DD} = 28 V, f = 960 MHz



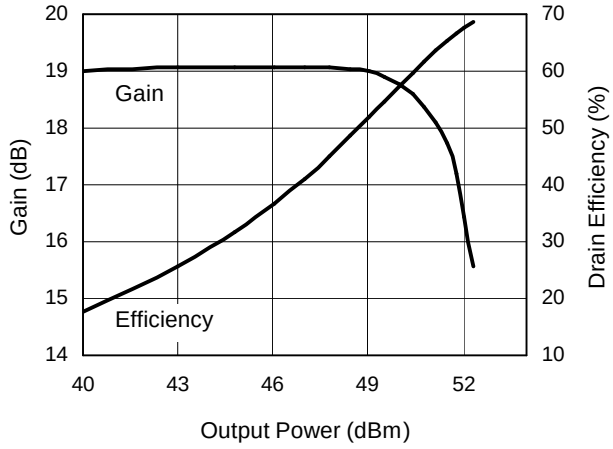
EDGE EVM Performance

V_{DD} = 28 V, I_{DQ} = 750 mA, f = 959.8 MHz



Gain & Efficiency vs. Output Power

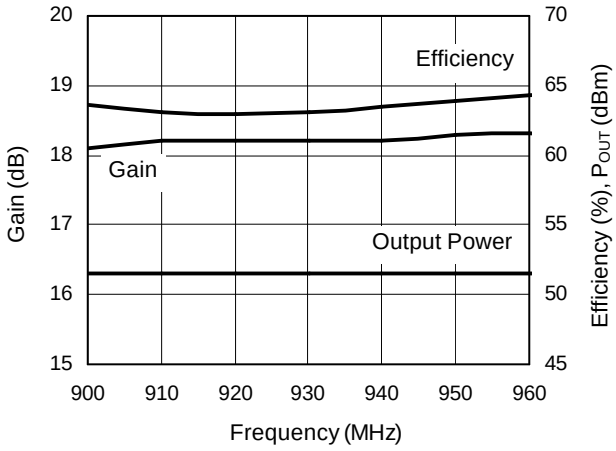
V_{DD} = 28 V, I_{DQ} = 750 mA, f = 960 MHz



Typical Performance (cont.)

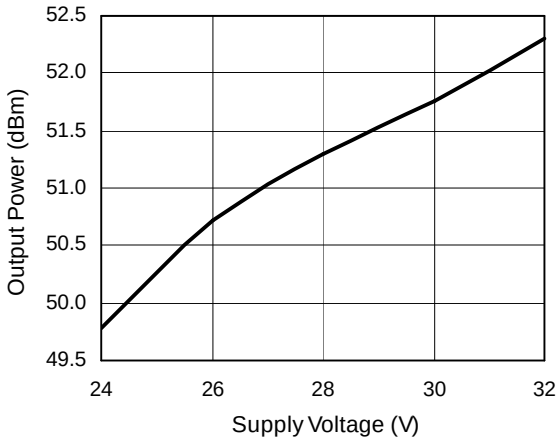
Frequency Sweep at P–1dB

V_{DD} = 28 V, I_{DQ} = 750 mA



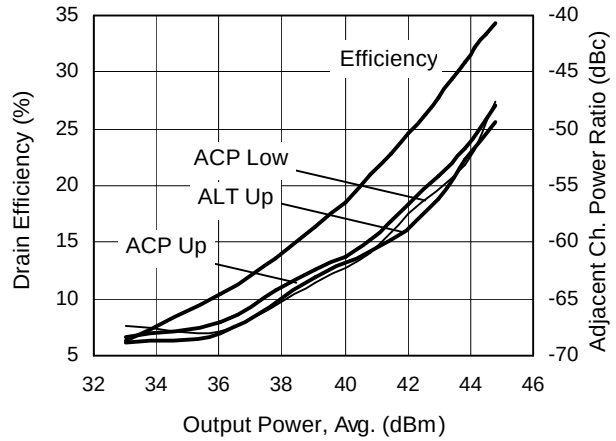
Output Power (P–1 dB) vs. Supply Voltage

I_{DQ} = 750 mA, f = 960 MHz



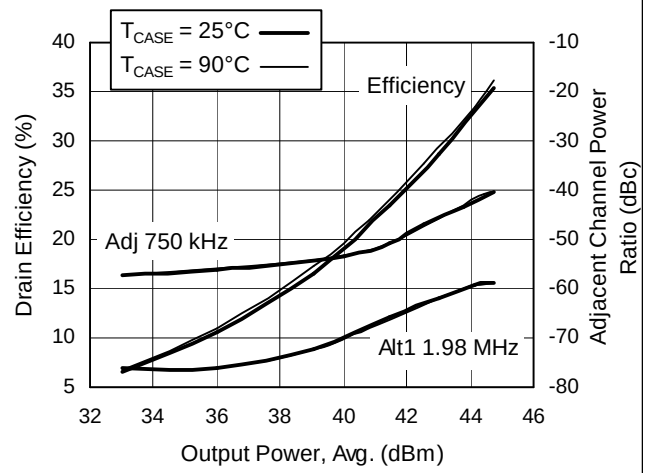
Three–Carrier CDMA 2000 Performance

V_{DD} = 28 V, I_{DQ} = 750 mA, f = 960 MHz

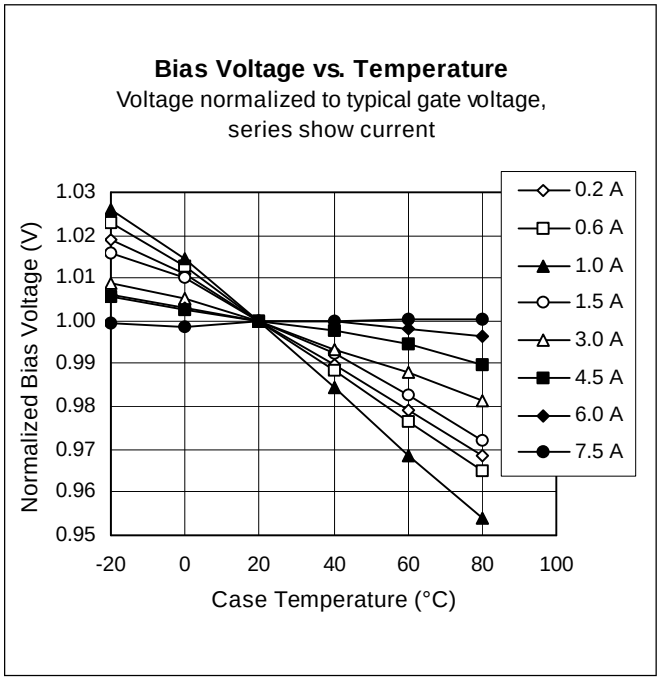


IS-95 CDMA Performance

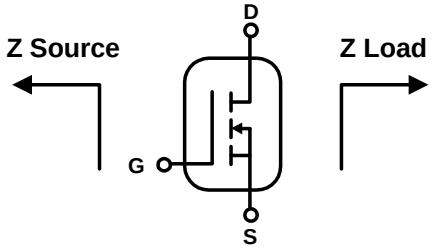
V_{DD} = 28 V, I_{DQ} = 750 mA, f = 960 MHz



Typical Performance (cont.)

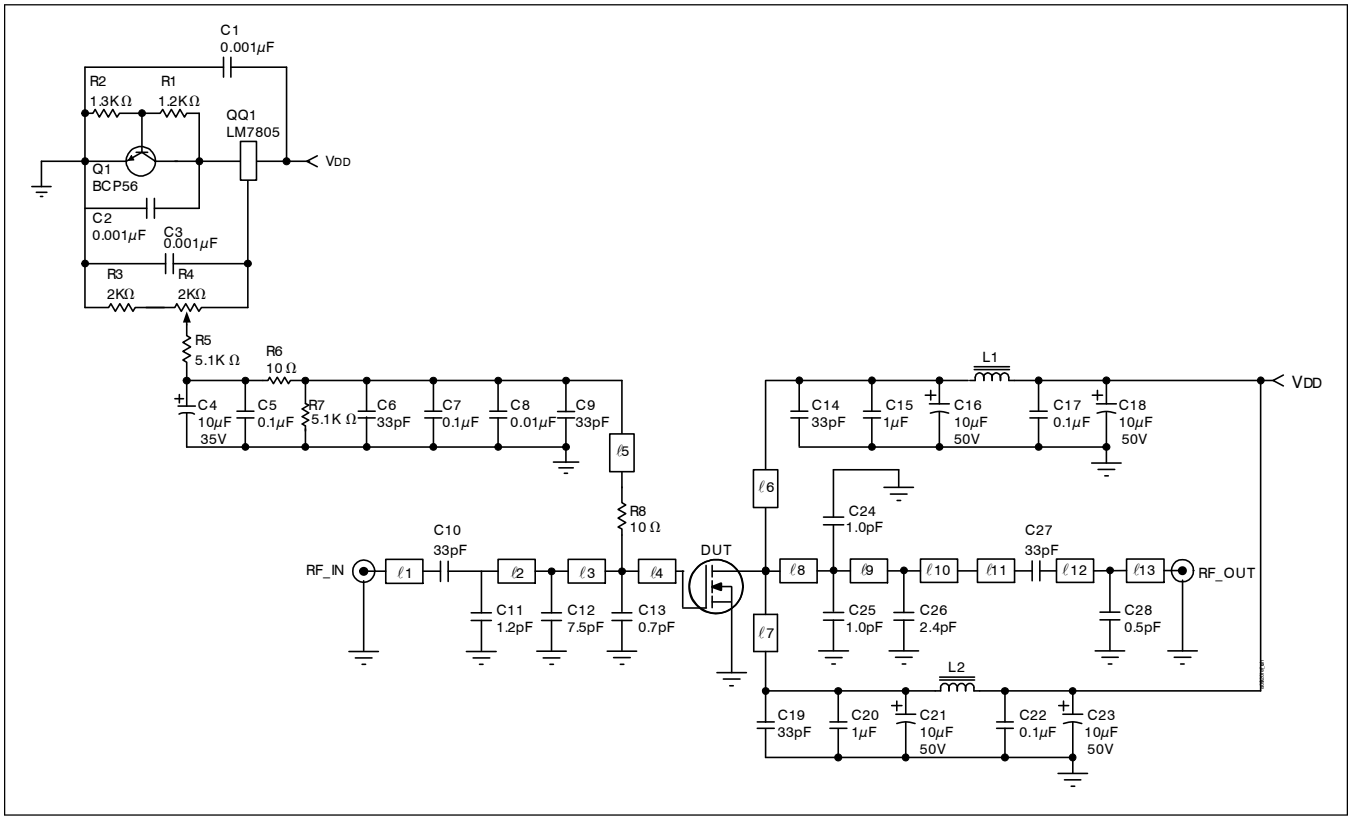


Broadband Circuit Impedance



Frequency	Z Source W		Z Load W	
MHz	R	jX	R	jX
920	5.86	–0.32	2.20	0.69
930	5.84	–0.27	2.17	0.69
940	5.85	–0.02	2.16	0.85
950	5.82	0.10	2.15	0.92
960	5.79	0.27	2.13	1.02

Reference Circuit



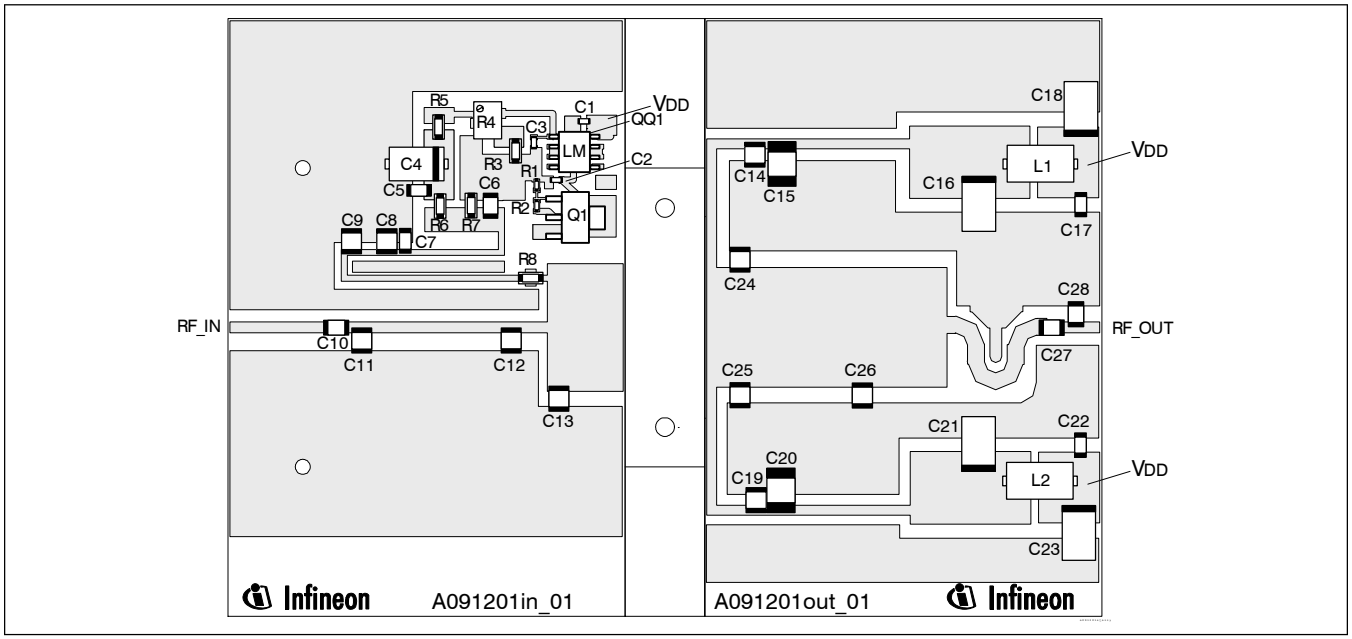
Reference circuit schematic for ƒ = 960 MHz

Circuit Assembly Information			
DUT	PTFA091201E or PTFA091201F	LDMOS Transistor	
PCB	0.76 mm [.030"] thick, ε_r = 4.5	Rogers TMM4	2 oz. copper

Microstrip	Electrical Characteristics at 960 MHz[1]	Dimensions: L x W (mm)	Dimensions: L x W (in.)
ℓ1	0.072 λ, 50.0 Ω	12.27 x 1.40	0.483 x 0.055
ℓ2	0.115 λ, 50.0 Ω	19.53 x 1.40	0.769 x 0.055
ℓ3	0.029 λ, 50.0 Ω	5.08 x 1.40	0.200 x 0.055
ℓ4	0.062 λ, 7.5 Ω	9.53 x 16.15	0.375 x 0.636
ℓ5	0.149 λ, 70.0 Ω	26.31 x 0.71	1.036 x 0.028
ℓ6, ℓ7	0.122 λ, 55.0 Ω	20.96 x 1.17	0.825 x 0.046
ℓ8	0.027 λ, 7.9 Ω	4.06 x 15.24	0.160 x 0.600
ℓ9	0.103 λ, 7.9 Ω	15.75 x 15.24	0.620 x 0.600
ℓ10	0.072 λ, 7.9 Ω	11.02 x 15.24	0.434 x 0.600
ℓ11	0.155 λ, 38.0 Ω	25.78 x 2.13	1.015 x 0.084
ℓ12	0.079 λ, 50.0 Ω	2.24 x 1.40	0.088 x 0.055
ℓ13	0.015 λ, 50.0 Ω	2.59 x 1.40	0.102 x 0.055

[1]Electrical characteristics are rounded.

Reference Circuit (cont.)



*Reference circuit assembly diagram (not to scale)**

Component	Description	Suggested Manufacturer	P/N or Comment
C1, C2, C3	Capacitor, 0.001 µF	Digi-Key	PCC1772CT-ND
C4	Tantalum capacitor, 10 µF, 35 V	Digi-Key	399-1655-2-ND
C5, C7 C17, C22	Capacitor, 0.1 µF	Digi-Key	PCC104BCT-ND
C6, C9, C10, C14, C19, C27	Ceramic capacitor, 33 pF	ATC	100B 330
C8	Capacitor, 0.01 µF	ATC	200B 103
C11	Ceramic capacitor, 1.2 pF	ATC	100B 1R2
C12	Ceramic capacitor, 7.5 pF	ATC	100B 7R5
C13	Ceramic capacitor, 0.7 pF	ATC	100B 0R7
C15, C20	Capacitor, 1.0 µF	ATC	920C105
C16, C18, C21, C23	Tantalum capacitor, 10 µF, 50 V	Garrett Electronics	TPSE106K050R0400
C24, C25	Ceramic capacitor, 1.0 pF	ATC	100B 1R0
C26	Ceramic capacitor, 2.4 pF	ATC	100B 2R4
C28	Ceramic capacitor, 0.5 pF	ATC	100B 0R5
L1, L2	Ferrite, 8.9 mm	Elna Magnetics	BDS 4.6/3/8.9-4S2
Q1	Transistor	Infinion Technologies	BCP56
QQ1	Voltage regulator	National Semiconductor	LM7805
R1	Chip Resistor 1.2 k-ohms	Digi-Key	P1.2KGCT-ND
R2	Chip Resistor 1.3 k-ohms	Digi-Key	P1.3KGCT-ND
R3	Chip Resistor 2 k-ohms	Digi-Key	P2KECT-ND
R4	Potentiometer 2 k-ohms	Digi-Key	3224W-202ETR-ND
R5, R7	Chip Resistor 5.1 k-ohms	Digi-Key	P5.1KECT-ND
R6, R8	Chip Resistor 10 ohms	Digi-Key	P10ECT-ND

**Gerber Files for this circuit available on request*

Package Outline Specifications

Package 30248

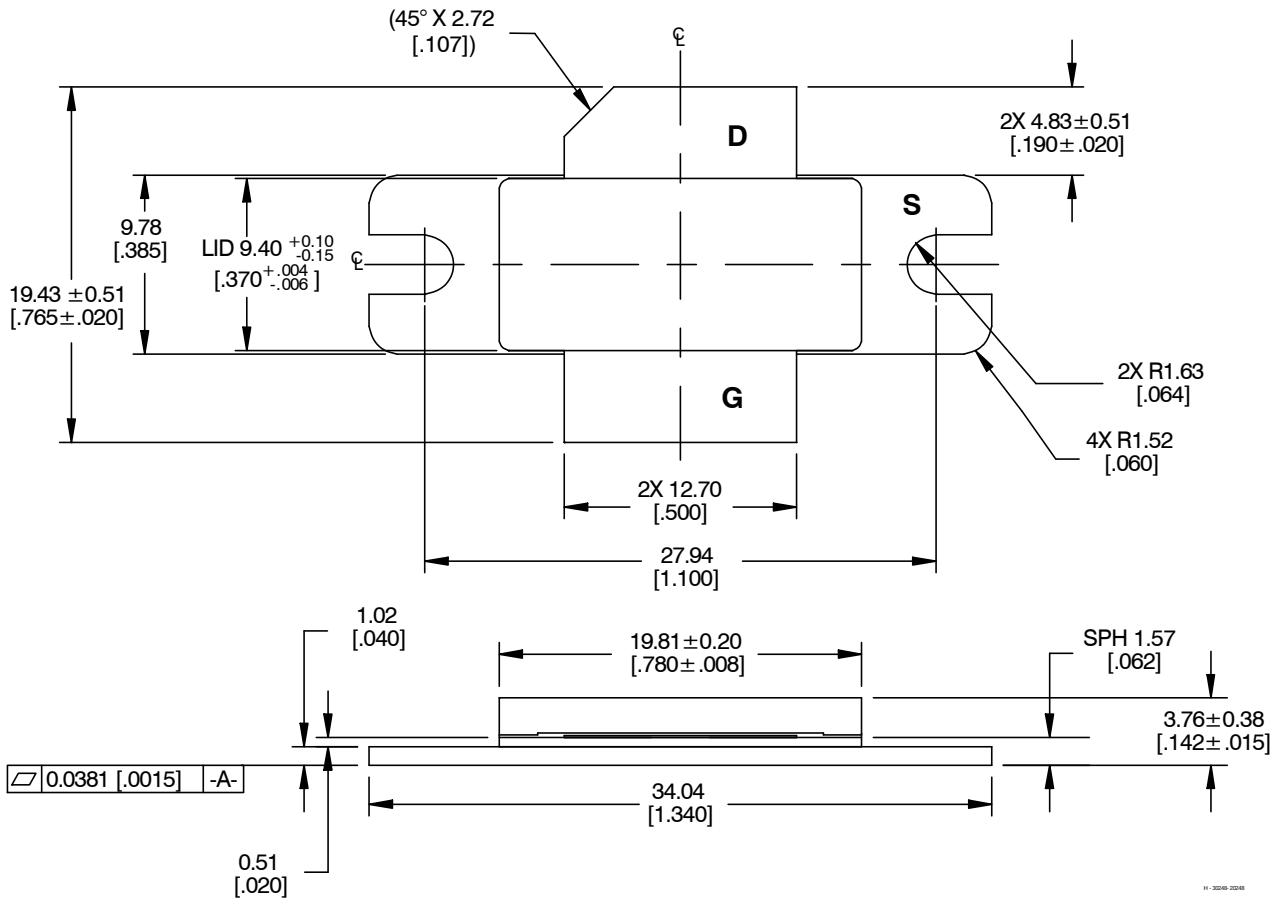


Diagram Notes:

1. Lead thickness: 0.10 +0.051/–0.025 [.004 +.002/–.001].
2. All tolerances ± 0.127 [.005] unless specified otherwise.
3. Pins: D = drain, S = source, G = gate.
4. Interpret dimensions and tolerances per ASME Y14.5M-1994.
5. Primary dimensions are mm. Alternate dimensions are inches.
6. Gold plating thickness:
   S - flange: 2.54 micron (min) [100 microinch (min)]
   D, G - leads: 1.14 micron ± 0.38 micron [45 microinch ± 15 microinch]

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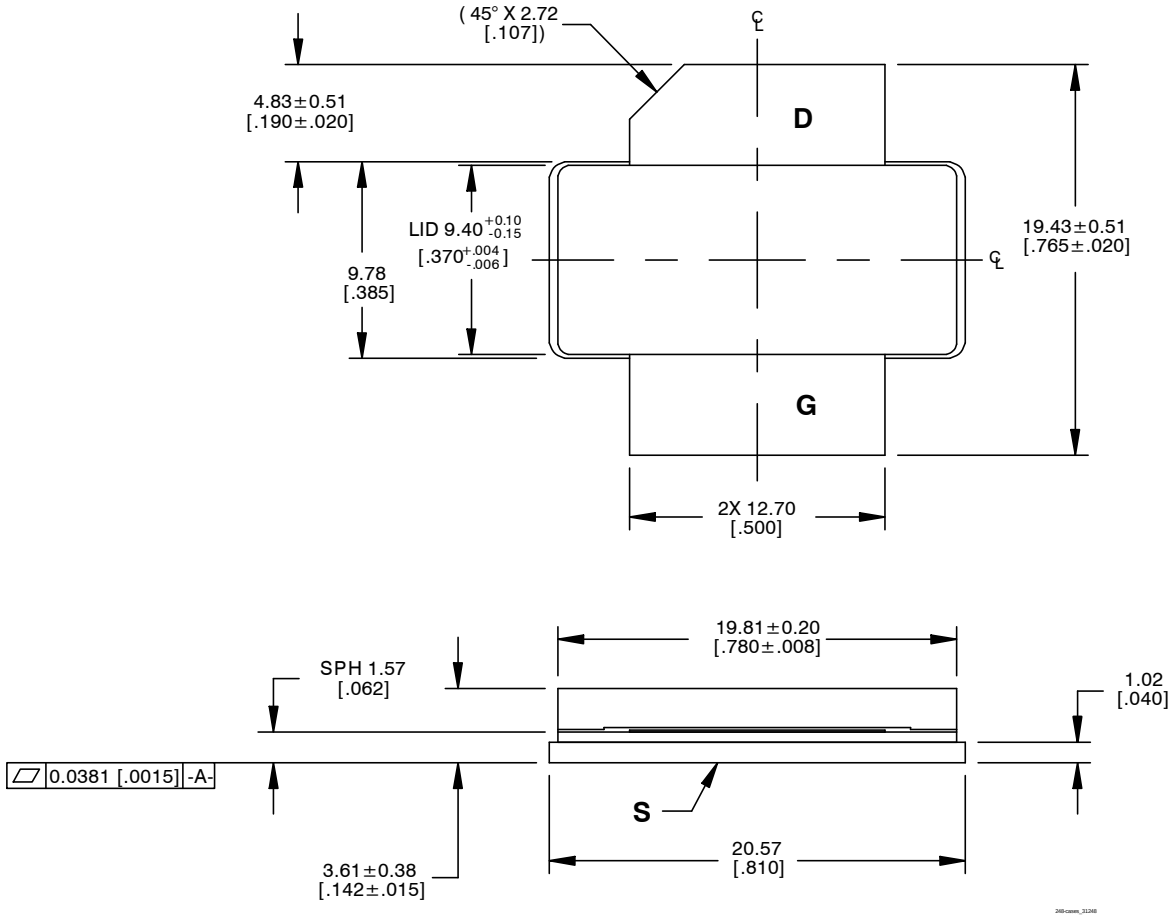
Package Outline Specifications (cont.)

Package 31248



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Revision History:	**2005-12-12**	Data Sheet
Previous Version:	None	

Page	Subjects (major changes since last revision)

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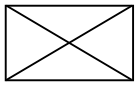

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