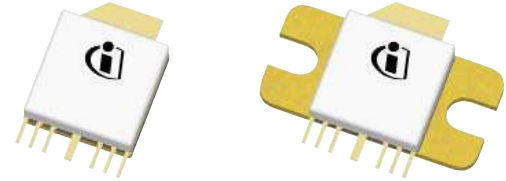


Wideband RF LDMOS Integrated Power Amplifier

45 W, 1900 – 2200 MHz

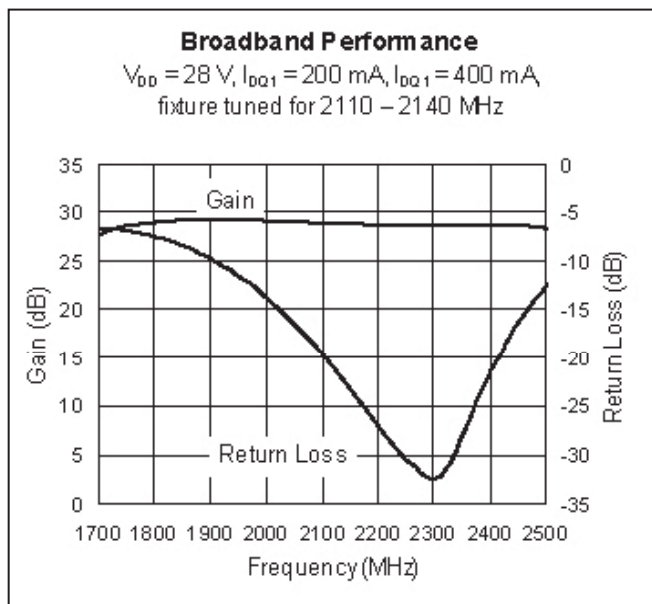
Description

The PTMA210452FL and PTMA210452EL are wideband, 45-watt, 2-stage, LDMOS integrated amplifiers intended for use in all typical modulation formats from 1900 to 2200 MHz. These devices are offered in thermally-enhanced ceramic packages with solder-friendly plating for cool and reliable operation.



PTMA210452FL
Package H-34265-8

PTMA210452EL
Package H-33265-8



Features

- Designed for wide RF and modulation bandwidths and low memory effects
- Typical two-carrier WCDMA performance at 2140 MHz, 28 V
 - Average output power = 3.2 W
 - Linear Gain = 28 dB
 - Efficiency = 10.5%
 - IMD3 = -47 dBc
- Typical two-tone performance, 2140 MHz, 28 V
 - Output power (PEP) = 45 W at IM3 = -30 dBc
 - Efficiency = 32%
- Capable of handling 10:1 VSWR @ 28 V, 45 W (CW) output power
- Integrated ESD protection. Meets HBM Class 1B (minimum), per JESD22-A114F
- Thermally-enhanced packages, Pb-free and RoHS compliant, with solder-friendly plating

RF Characteristics

Two-carrier WCDMA Measurements (tested in Infineon test fixture)

$V_{DD} = 28\text{ V}$, $I_{DQ1} = 200\text{ mA}$ (tuned for linearity), $I_{DQ2} = 450\text{ mA}$ (tuned for linearity & efficiency), $P_{OUT} = 3.2\text{ W}$ average, $f_1 = 2135\text{ MHz}$, $f_2 = 2145\text{ MHz}$, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 8 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Input Return Loss	IRL	—	-16	-10	dB
Gain	G_{ps}	26.5	28	—	dB
Drain Efficiency	η_D	9	10.5	—	%
Intermodulation Distortion, 2-channel WCDMA	IMD	-43	-47	—	dBc

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

ESD: Electrostatic discharge sensitive device—observe handling precautions!

RF Characteristics

Small-signal CW Measurements (not subject to production test—verified by design/characterization in Infineon test fixture)
 $V_{DD} = 28\text{ V}$, $I_{DQ1} = 200\text{ mA}$, $I_{DQ2} = 450\text{ mA}$, $P_{OUT} = 1\text{ W}$, $f = 2140\text{ MHz}$

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Gain Flatness	1 W / 30 MHz	ΔG	—	0.10	0.5	dB
Phase Linearity		—	−1	+0.6	+1	°/60 MHz
Group Delay	$f = 2140\text{ MHz}$	td	—	2.16	—	ns

DC Characteristics

Stage 1 Characteristics	Conditions	Symbol	Min	Typ	Max	Unit
Drain Leakage Current	$V_{DS} = 28\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	1.0	μA
	$V_{DS} = 63\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	10.0	μA
Gate Leakage Current	$V_{GS} = 10\text{ V}$, $V_{DS} = 0\text{ V}$	I_{GSS}	—	—	1.0	μA
On-state Resistance	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	1.1	—	Ω
Operating Gate Voltage	$V_{DS} = 28\text{ V}$, $I_{DQ1} = 200\text{ mA}$,	V_{GS}	2.0	2.5	3.0	V

Stage 2 Characteristics	Conditions	Symbol	Min	Typ	Max	Unit
Drain-source Breakdown Voltage	$V_{GS} = 0\text{ V}$, $I_{DS} = 10\text{ mA}$	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	$V_{DS} = 28\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	1.0	μA
	$V_{DS} = 63\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	10.0	μA
Gate Leakage Current	$V_{GS} = 10\text{ V}$, $V_{DS} = 0\text{ V}$	I_{GSS}	—	—	1.0	μA
On-state Resistance	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.16	—	Ω
Operating Gate Voltage	$V_{DS} = 28\text{ V}$, $I_{DQ2} = 450\text{ mA}$	V_{GS}	2.0	2.5	3.0	V

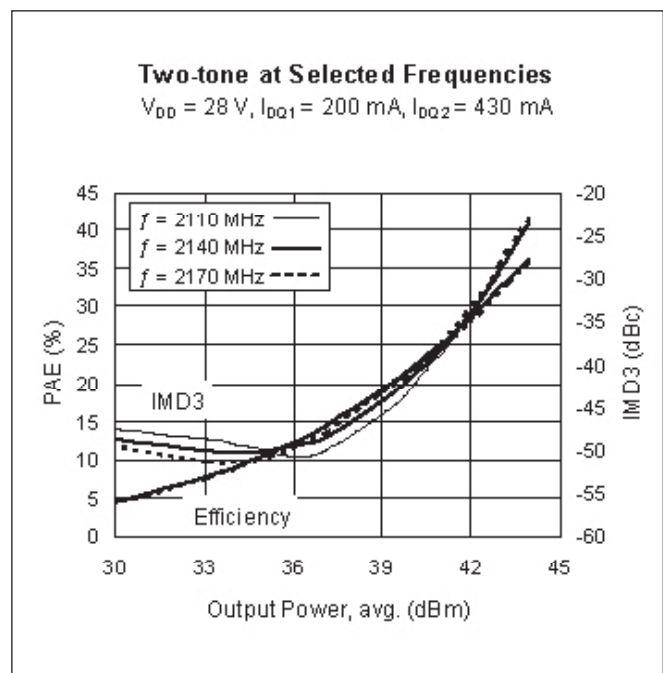
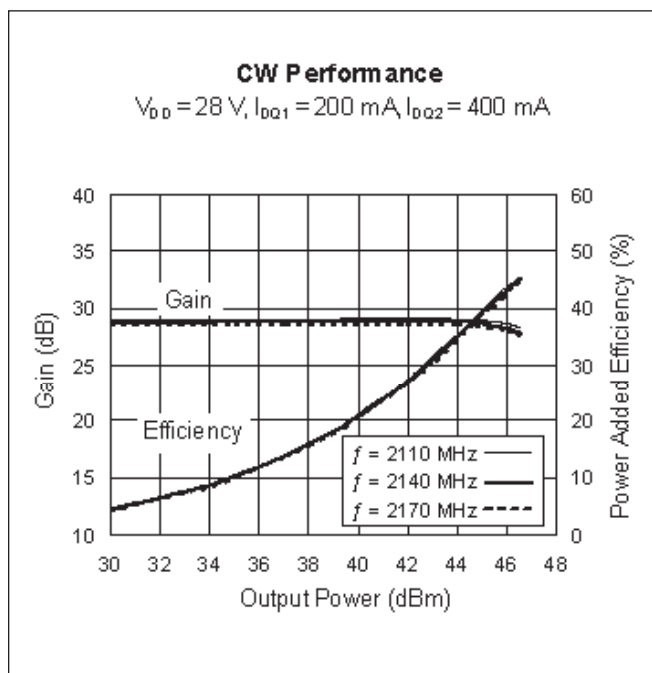
Maximum Ratings

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
Input Power	P_{IN}	25	dBm
Storage Temperature Range	T_{STG}	-40 to +150	°C
Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}$)	Stage 1	$R_{\theta JC}$	3.5 °C/W
	Stage 2	$R_{\theta JC}$	1.3 °C/W

Ordering Information

Type and Version	Package Outline	Package Description	Shipping
PTMA210452EL V1	H-33265-8	Thermally-enhanced slotted flange	Tray
PTMA210452EL V1 R250	H-33265-8	Thermally-enhanced slotted flange	Tape & Reel
PTMA210452FL V1	H-34265-8	Thermally-enhanced earless flange	Tray
PTMA210452FL V1 R250	H-34265-8	Thermally-enhanced earless flange	Tape & Reel

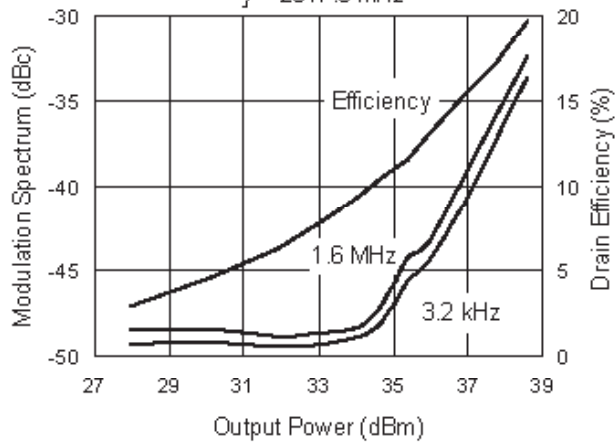
Typical Performance (data taken in a production test fixture)



Typical Performance (cont.)

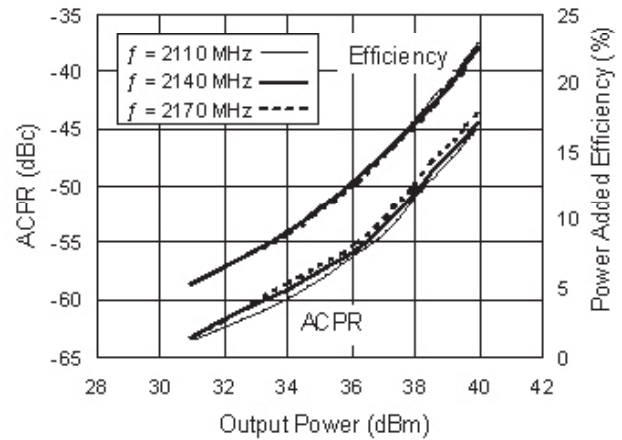
6-Carrier TD-CDMA Modulation Spectrum Performance

$V_{DD} = 28\text{ V}$, $I_{DQ1} = 280\text{ mA}$, $I_{DQ2} = 390\text{ mA}$,
 $f = 2017.5\text{ MHz}$



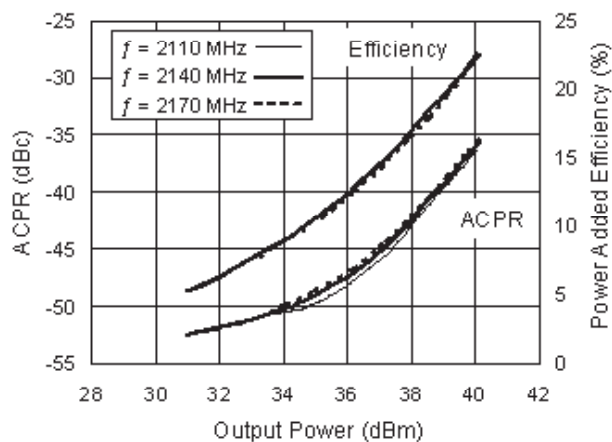
IS-95 at Selected Frequencies

$V_{DD} = 28\text{ V}$, $I_{DQ1} = 200\text{ mA}$, $I_{DQ2} = 430\text{ mA}$



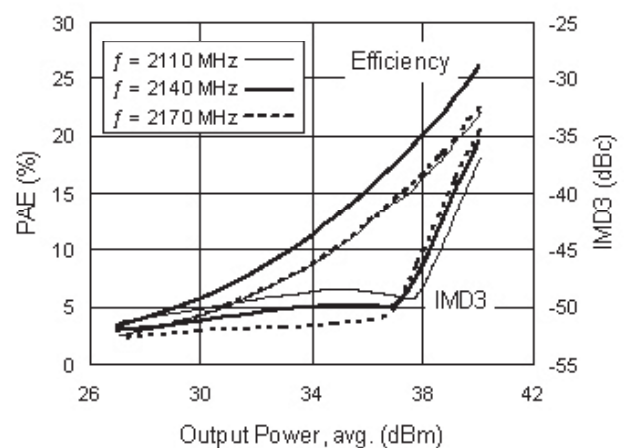
WCDMA at Selected Frequencies

$V_{DD} = 28\text{ V}$, $I_{DQ1} = 200\text{ mA}$, $I_{DQ2} = 430\text{ mA}$,
TM 1, 64 channel, 67% clipping

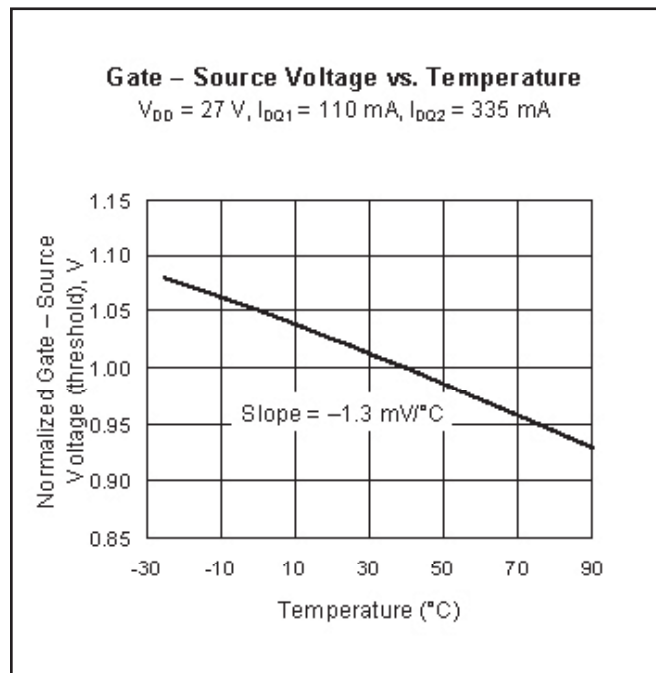


Two-carrier WCDMA Performance

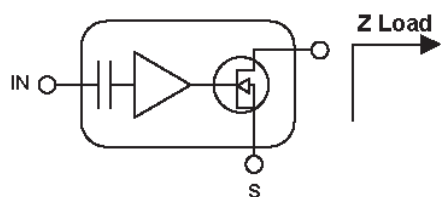
$V_{DD} = 28\text{ V}$, $I_{DQ1} = 200\text{ mA}$, $I_{DQ2} = 430\text{ mA}$, $f = 2110\text{ MHz}$, PAR = 8.5 dB, 10 MHz spacing



Typical Performance (cont.)

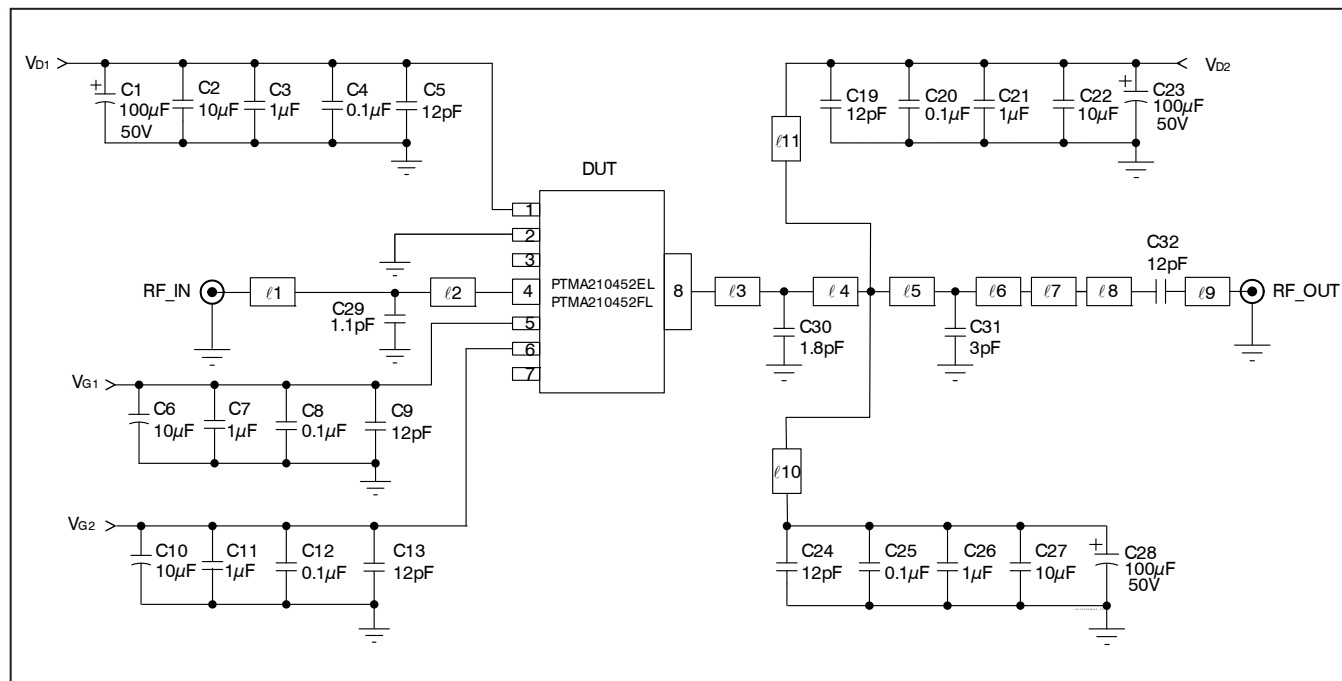


Broadband Circuit Impedance



Frequency MHz	Z Source Ω		Z Load Ω	
	R	jX	R	jX
1900	25.2	20.4	8.8	12.2
2110	26.1	27.8	6.1	16.5
2140	26.2	28.9	5.9	17.1
2170	26.5	30.3	5.6	17.8
2200	26.6	31.6	5.2	18.6

Reference Circuit — for evaluation only



Reference circuit schematic for $f = 2140$ MHz

Circuit Assembly Information

DUT PTMA210452EL or PTMA210452FL RF LDMOS Integrated Power Amplifier ICs

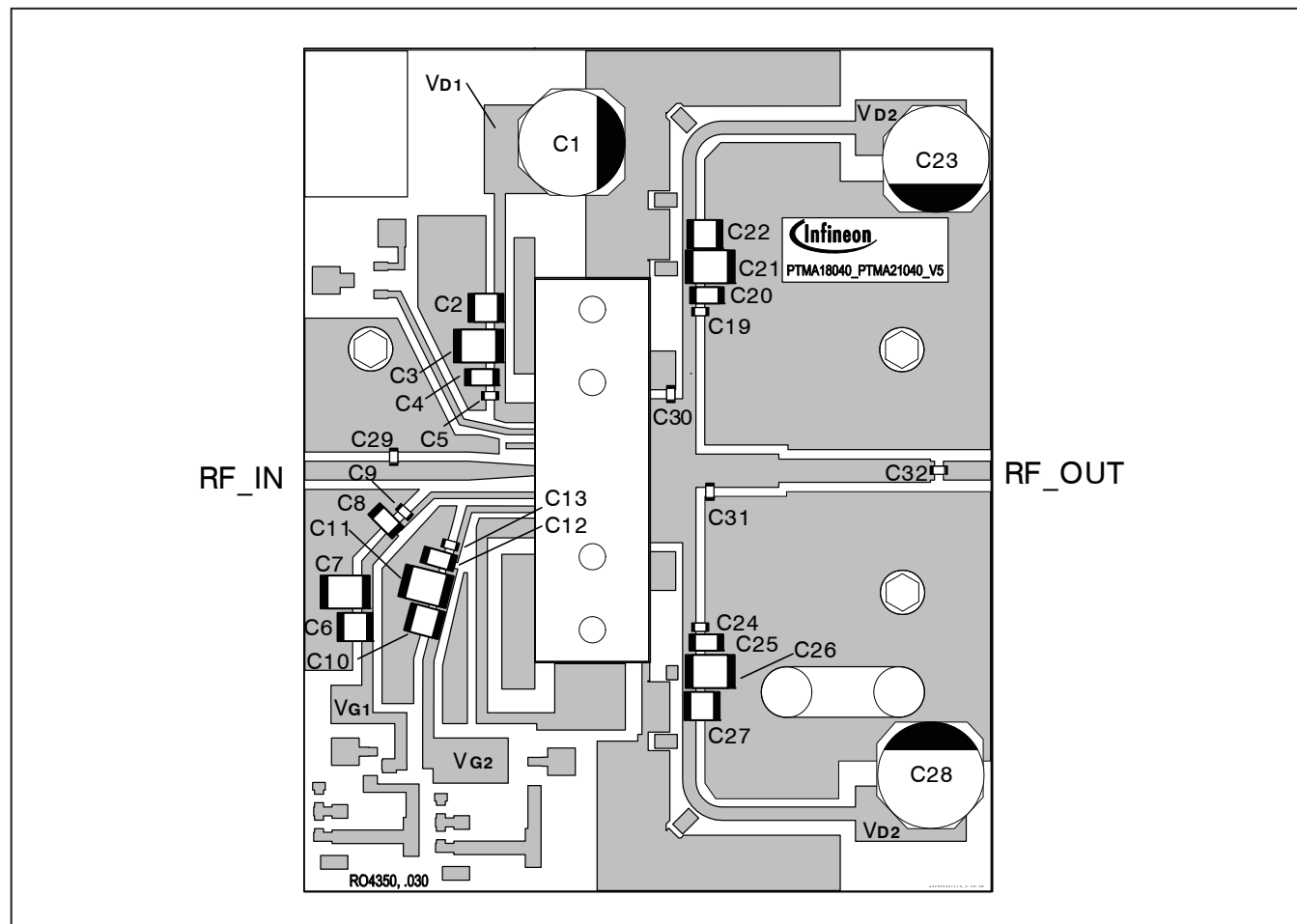
Test Fixture Part No. LTN/PTMA210452

PCB Rogers RO4350 $\epsilon_r = 3.48$, 0.76 mm [.030"] thick, 1 oz. copper

Find Gerber files for this test fixture on the Infineon Web site at <http://www.infineon.com/rfpower>

Microstrip	Electrical Characteristics at 2140 MHz	Dimensions: L x W (mm)	Dimensions: L x W (in.)
ℓ_1	0.129λ , 49.7 Ω	11.00 x 1.70	0.433 x 0.067
ℓ_2	0.114λ , 49.7 Ω	9.68 x 1.70	0.381 x 0.067
ℓ_3	0.040λ , 10.4 Ω	3.10 x 13.00	0.122 x 0.512
ℓ_4	0.013λ , 10.4 Ω	1.02 x 13.00	0.039 x 0.512
ℓ_5	0.024λ , 34.1 Ω	2.01 x 3.00	0.079 x 0.118
ℓ_6	0.066λ , 34.1 Ω	5.46 x 3.00	0.215 x 0.118
ℓ_7	0.162λ , 43.4 Ω	13.67 x 2.11	0.538 x 0.083
ℓ_8	0.004λ , 49.7 Ω	0.38 x 1.70	0.015 x 0.067
ℓ_9	0.050λ , 49.7 Ω	4.24 x 1.70	0.167 x 0.067
ℓ_{10}, ℓ_{11}	0.128λ , 61.2 Ω	11.00 x 1.19	0.433 x 0.047

Reference Circuit (cont.)



Reference circuit assembly diagram (not to scale)

Circuit Assembly Table

Component	Description	Suggested Supplier	P/N or Comment
C1, C23, C28	Electrolytic capacitor 100 μ F, 50 V	Digi-Key	PCE3718CT-ND
C2, C6, C10, C22, C27	Ceramic capacitor 10 μ F	Murata	GRM422Y5V106Z050AL
C3, C7, C11, C21, C26	Ceramic capacitor 1 μ F	Digi-Key	445-1411-2-ND
C4, C8, C12, C20, C25	Capacitor, 0.1 μ F	Digi-Key	399-1267-2-ND
C5, C9, C13, C19, C24, C32	Ceramic capacitor 12 pF	ATC	600S120JT
C29	Ceramic capacitor 1.1 pF	ATC	600S1R1BT
C30	Ceramic capacitor 1.8 pF	ATC	600S1R8BT
C31	Ceramic capacitor 3 pF	ATC	600S3R0BT
Not used	C14, C15, C16, C17, C18		

Package H-33265-8 Outline



1. Interpret dimensions and tolerances per ASME Y14.5M-1994.
2. Pins: see page 10 for complete list and pinout diagram.
3. Lead thickness: 0.127 ± 0.025 [0.005 ± 0.001].
4. Gold plating less than 0.25 micron [10 microinch].
5. All tolerances ± 0.127 [0.005] unless specified otherwise.
6. Exposed metal plane on bottom of ceramic insulator.
7. Primary dimensions are inches, alternate dimensions are mm.

Package Specifications (cont.)

Package H-34265-8 Outline

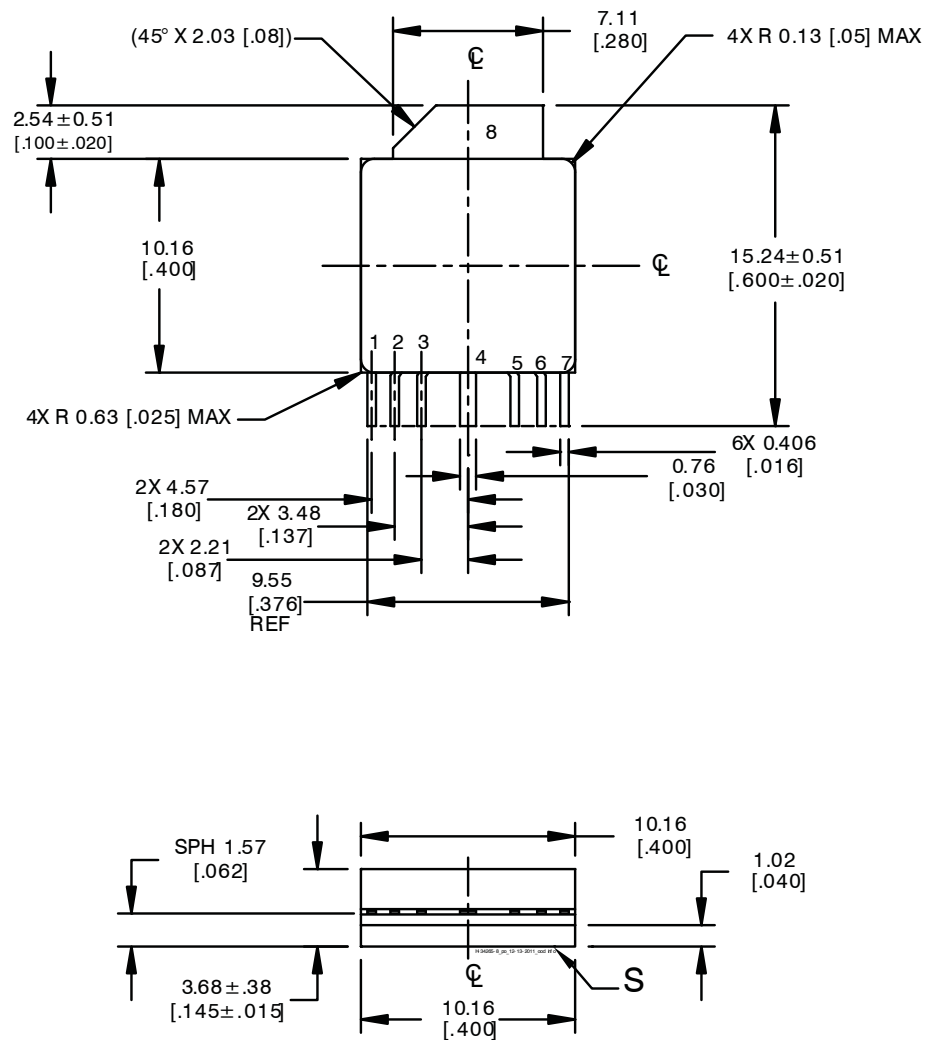
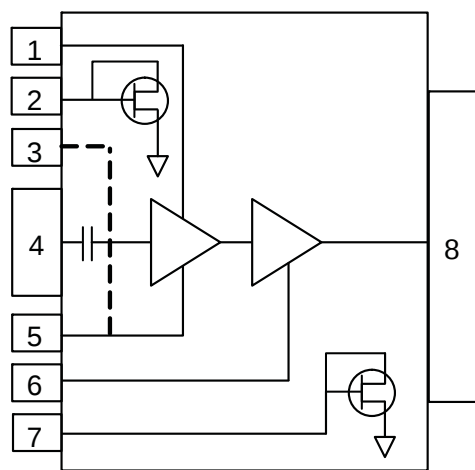


Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994.
2. Pins: see page 10 for complete list and pinout diagram.
3. Lead thickness: 0.127 ± 0.025 [0.005 ± 0.001].
4. Gold plating less than 0.25 micron [10 microinch].
5. All tolerances ± 0.127 [0.005] unless specified otherwise.
6. Primary dimensions are inches, alternate dimensions are mm.

Package Specifications (cont.)

Package H-3X265-8 Pinout



Pin #	Function
S (Flange)	Source
1	V_{D1}
2	V_{G1} thermal FET
3	V_{G1}
4	RF In
5	V_{G1}
6	V_{G2}
7	V_{G2} thermal FET
8	RF Out

Find the latest and most complete information about products and packaging at the Infineon Internet page
<http://www.infineon.com/rfpower>

Previous Version: 2009-09-01, Data Sheet

Page	Subjects (major changes since last revision)
	Revised DC Characteristics table for clarity.

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