4.9-5.8 GHz High-Linearity Power Amplifier
SST11LP12

Preliminary Specifications

FEATURES:

- **High Gain:**
  - Typically 35 dB gain across 4.9-5.8 GHz over temperature 0°C to +85°C
- **High linear output power:**
  - ~28 dBm P1dB (Pulsed single-tone signal)
  - Meet 802.11a OFDM ACPR requirement up to 23+ dBm over ~ entire band
  - Added EVM~4% up to 21 dBm for 54 Mbps 802.11a signal
- **High power-added efficiency/Low operating current for 54 Mbps 802.11a applications**
  - ~12% @ P_{OUT} = 21 dBm for 54 Mbps
- **Built-in Ultra-low I_{REF} power-up/down control**
  - I_{REF} <3 mA
- **Low idle current**
  - ~130 mA I_{CQ}
- **High speed power up/down**
  - Turn on/off time (10%~90%) <100 ns
  - Typical power-up/down delay with driver delay included <200 ns
- **High temperature stability**
  - ~1.5/1.0 dB gain/power variation between 0°C to +85°C
  - ~1 dB detector variation over 0°C to +85°C
- **Low shut-down current (< 0.1 µA)**
- **On-chip power detection**
- **20 dB dynamic range on-chip power detection**
- **Simple input/output matching**
- **Packages available**
  - 16-contact WQFN (3mm x 3mm)
  - Non-Pb (lead-free) packages available

APPLICATIONS:

- **WLAN (IEEE 802.11a)**
- **Japan WLAN**
- **HyperLAN2**
- **Multimedia**

PRODUCT DESCRIPTION

The SST11LP12 is a high-power, high-gain power amplifier based on the highly-reliable InGaP/GaAs HBT technology.

The SST11LP12 can be easily configured for high-power, high-efficiency applications with superb power-added efficiency while operating over the entire 802.11a frequency band for U.S., European, and Japanese markets (4.9-5.8 GHz). It typically provides 35 dB gain with 16% power-added efficiency @ P_{OUT} = 23 dBm.

The SST11LP12 has excellent linearity, typically ~4% added EVM at 21 dBm output power which is essential for 54 Mbps 802.11a operation while meeting 802.11a spectrum mask at 23+ dBm. SST11LP12 also has wide-range (>20 dB), temperature-stable (~1 dB over 85°C), single-ended/differential power detectors which lower users' cost on power control.

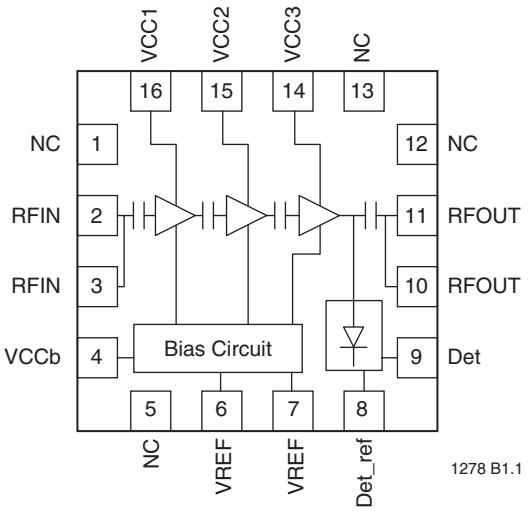
The power amplifier IC also features easy board-level usage along with high-speed power-up/down control. Ultra-low reference current (total I_{REF} <3 mA) makes the SST11LP12 controllable by an on/off switching signal directly from the baseband chip. These features coupled with low operating current make the SST11LP12 ideal for the final stage power amplification in battery-powered 802.11a WLAN transmitter and access point applications.

The SST11LP12 is offered in 16-contact WQFN package. See Figure 1 for pin assignments and Table 1 for pin descriptions.

Preliminary Specifications

FUNCTIONAL BLOCKS

FUNCTIONAL BLOCK DIAGRAM



PIN ASSIGNMENTS

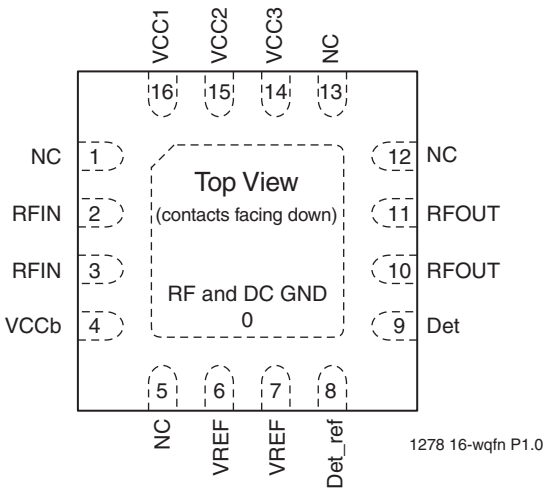


FIGURE 1: PIN ASSIGNMENTS FOR 16-CONTACT WQFN

PIN DESCRIPTIONS

TABLE 1: PIN DESCRIPTION

Symbol	Pin No.	Pin Name	Type[1]	Function
GND	0	Ground		The center pad should be connected to RF ground with several low inductance, low resistance vias.
NC	1	No Connection		Unconnected pin
RFIN	2		I	RF input, DC decoupled
RFIN	3		I	RF input, DC decoupled
VCCb	4	Power Supply	PWR	Supply voltage for bias circuit
NC	5	No Connection		Unconnected pin
VREF	6		PWR	Current Control
VREF	7		PWR	Current Control
Det_ref	8		O	On-chip power detector reference
Det	9		O	On-chip power detector
RFOUT	10		O	RF output
RFOUT	11		O	RF output
NC	12	No Connection		Unconnected pin
NC	13	No Connection		Unconnected pin
VCC3	14	Power Supply	PWR	Power supply, 3rd stage
VCC2	15	Power Supply	PWR	Power supply, 2nd stage
VCC1	16	Power Supply	PWR	Power supply, 1st stage

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1. I=Input, O=Output

Preliminary Specifications

ELECTRICAL SPECIFICATIONS

The AC and DC specifications for the power amplifier interface signals. Refer to Table 2 for the DC voltage and current specifications. Refer to Figures 2 through 10 for the RF performance.

Absolute Maximum Stress Ratings (Applied conditions greater than those listed under "Absolute Maximum Stress Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these conditions or conditions greater than those defined in the operational sections of this data sheet is not implied. Exposure to absolute maximum stress rating conditions may affect device reliability.)

Supply Voltage at pins 4, 14, 15, 16 (V_{CC}) . . . . . -0.3V to +5.5V
DC supply current (I_{CC}) . . . . . 500 mA
Operating Temperature (T_A) . . . . . -40ºC to +85ºC
Storage Temperature (T_{STG}) . . . . . -40ºC to +120ºC
Maximum Junction Temperature (T_J) . . . . . +150ºC
Surface Mount Solder Reflow Temperature . . . . . 260°C for 10 seconds

OPERATING RANGE

Range	Ambient Temp	V_{CC}
Industrial	-40°C to +85°C	3.3V

TABLE 2: DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Min.	Typ	Max.	Unit	Test Conditions
V_{CC}	Supply Voltage at pins 4, 14, 15, 16	2.7	3.3	3.6	V	
I_{CC}	Supply Current @ P_{OUT} = 23 dBm at V_{CC} = 3.3V			400	mA	
I_{CQ}	V_{CC} quiescent current		130		mA	
I_{OFF}	Shut down current		<1.0		µA	
V_{REG}	Reference Voltage for recommended application		2.85		V	

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TABLE 3: AC ELECTRICAL CHARACTERISTICS FOR CONFIGURATION

Symbol	Parameter	Min	Typ	Max	Unit
F_{L-U}	Frequency range	4.9		5.8	GHz
Linearity	Output power with 4% EVM at 54 Mbps OFDM signal when operating at 3.3V V_{CC}		21		dBm
	Output power level with 802.11a mask compliance across 4.9-5.8 GHz	23			dBm
G	Linear gain across 4.9~5.8GHz	32			dB
G_{VAR}	Gain variation over band (4.9-5.8 MHz)			3	dB
	Gain variation over band (4.9-5.35 MHz)			1.5	dB
	Gain variation over band (5.7-5.8 MHz)			1	dB
	Gain variation over channel (20 MHz)		0.2		dB
Det	Power detector output voltage range	0.5		2.0	V
Det_ref	Power detector output reference	0.5	0.6		V
S	Power detector sensitivity		0.03		V/dB
2f, 3f, 4f, 5f	Harmonics at 22 dBm, without trapping capacitors		-40		dBc

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TYPICAL PERFORMANCE CHARACTERISTICS

TEST CONDITIONS: V_{CC} = 3.3V, T_A = 25°C, $V_{REG1,2}$ = 2.85V UNLESS OTHERWISE NOTED

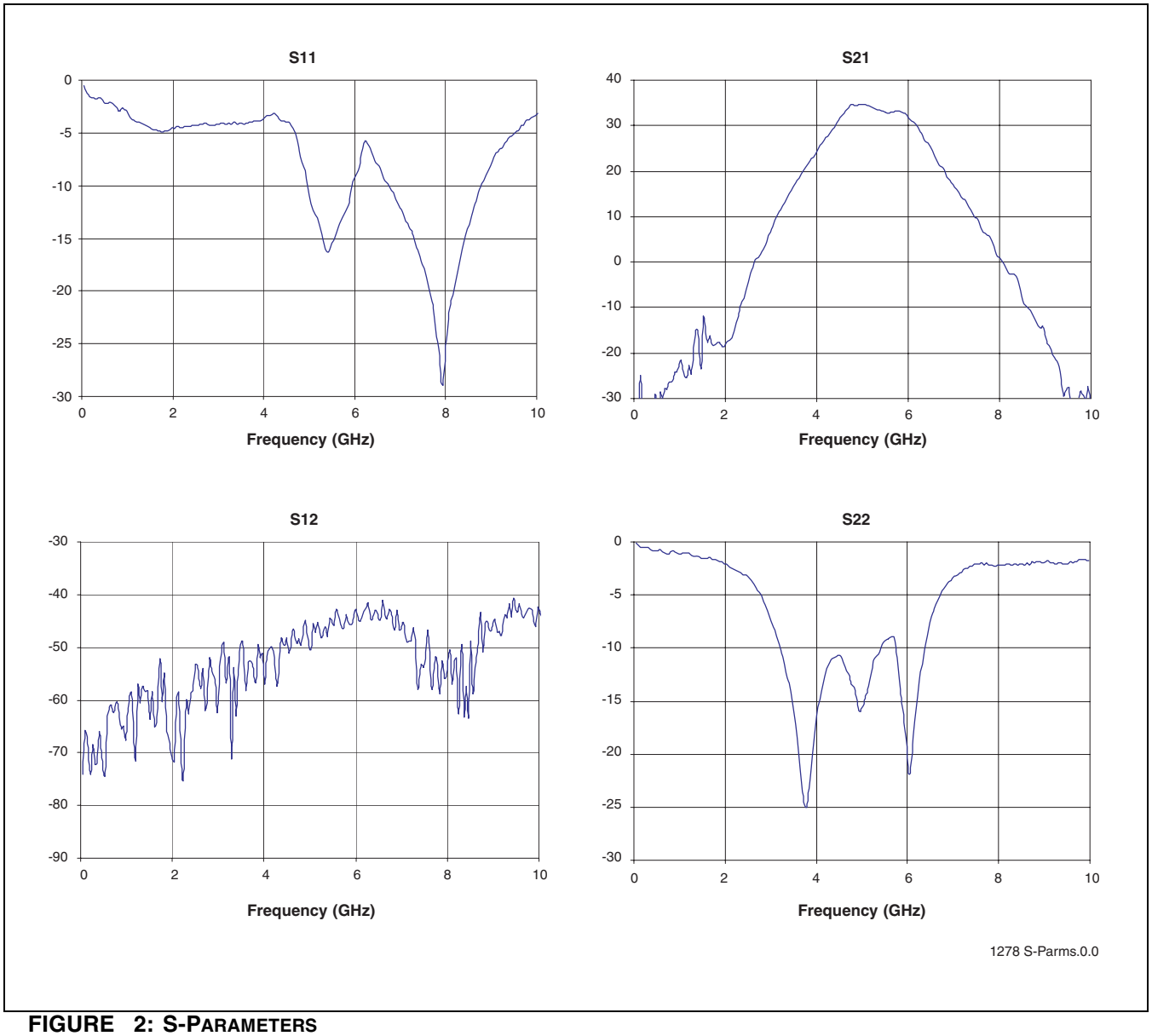


FIGURE 2: S-PARAMETERS

TWO-TONE MEASUREMENTS
TEST CONDITIONS: ΔF = 1 MHz

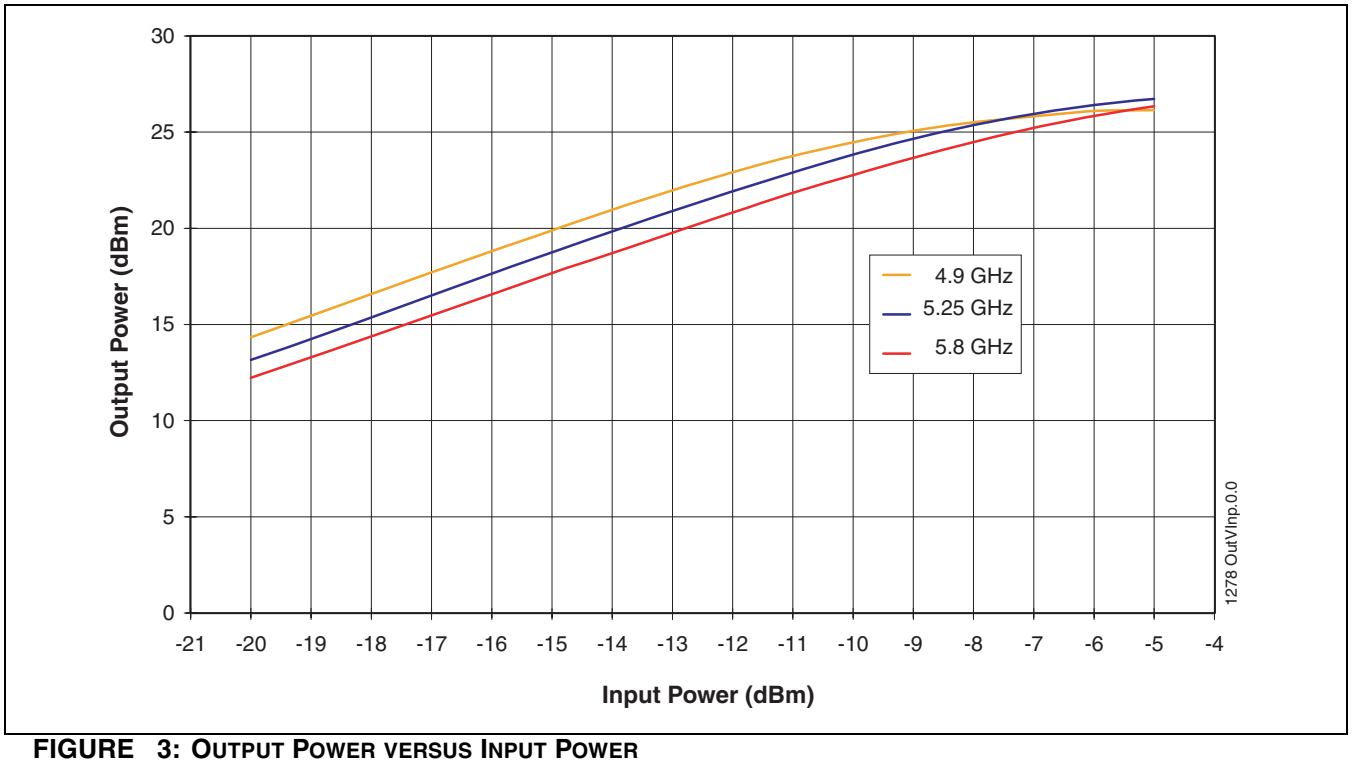


FIGURE 3: OUTPUT POWER VERSUS INPUT POWER

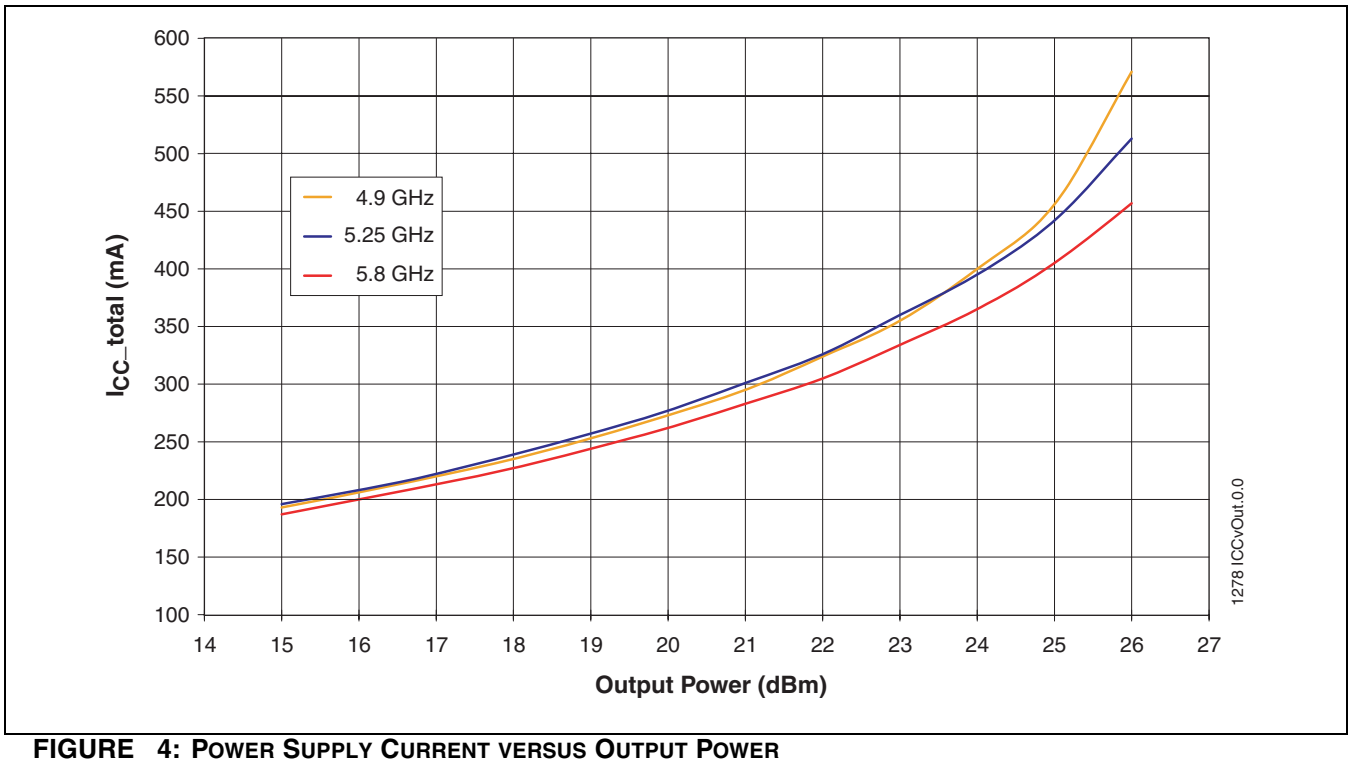


FIGURE 4: POWER SUPPLY CURRENT VERSUS OUTPUT POWER

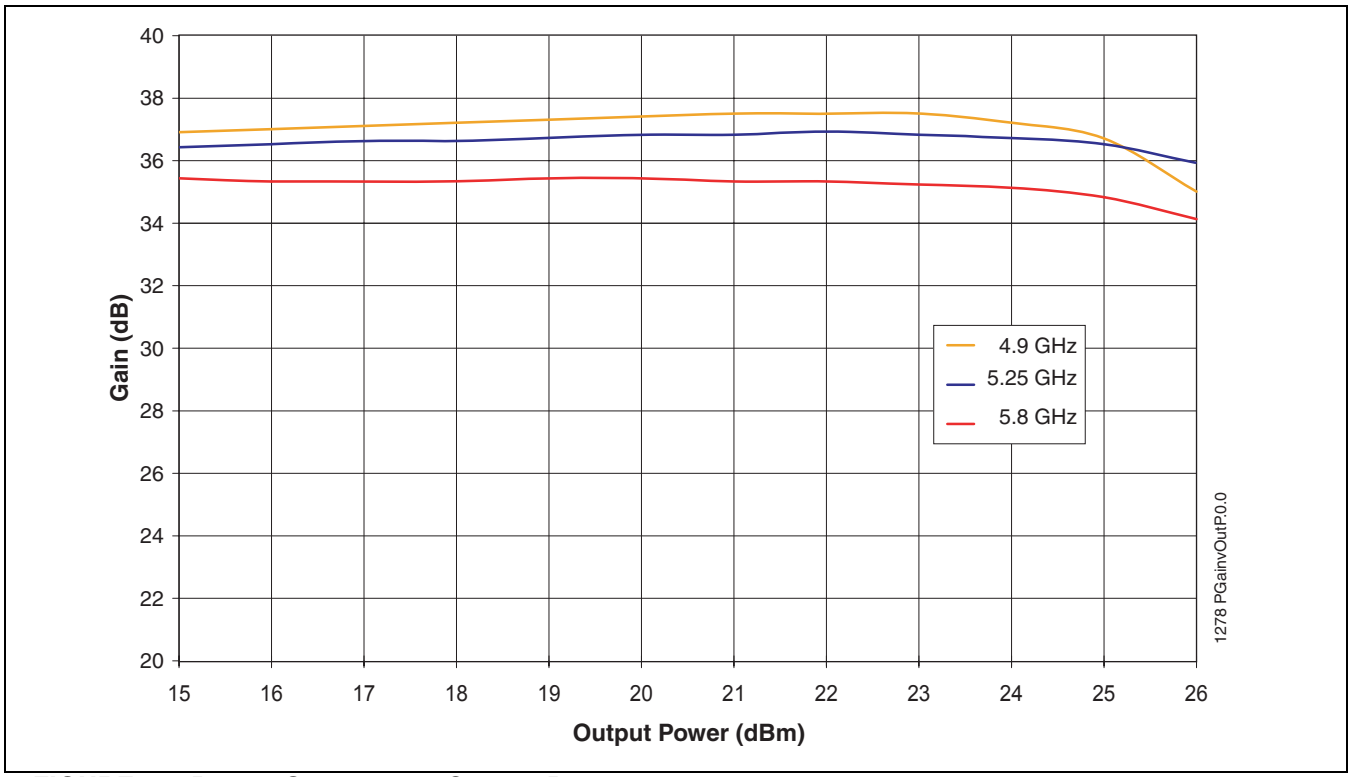


FIGURE 5: POWER GAIN VERSUS OUTPUT POWER

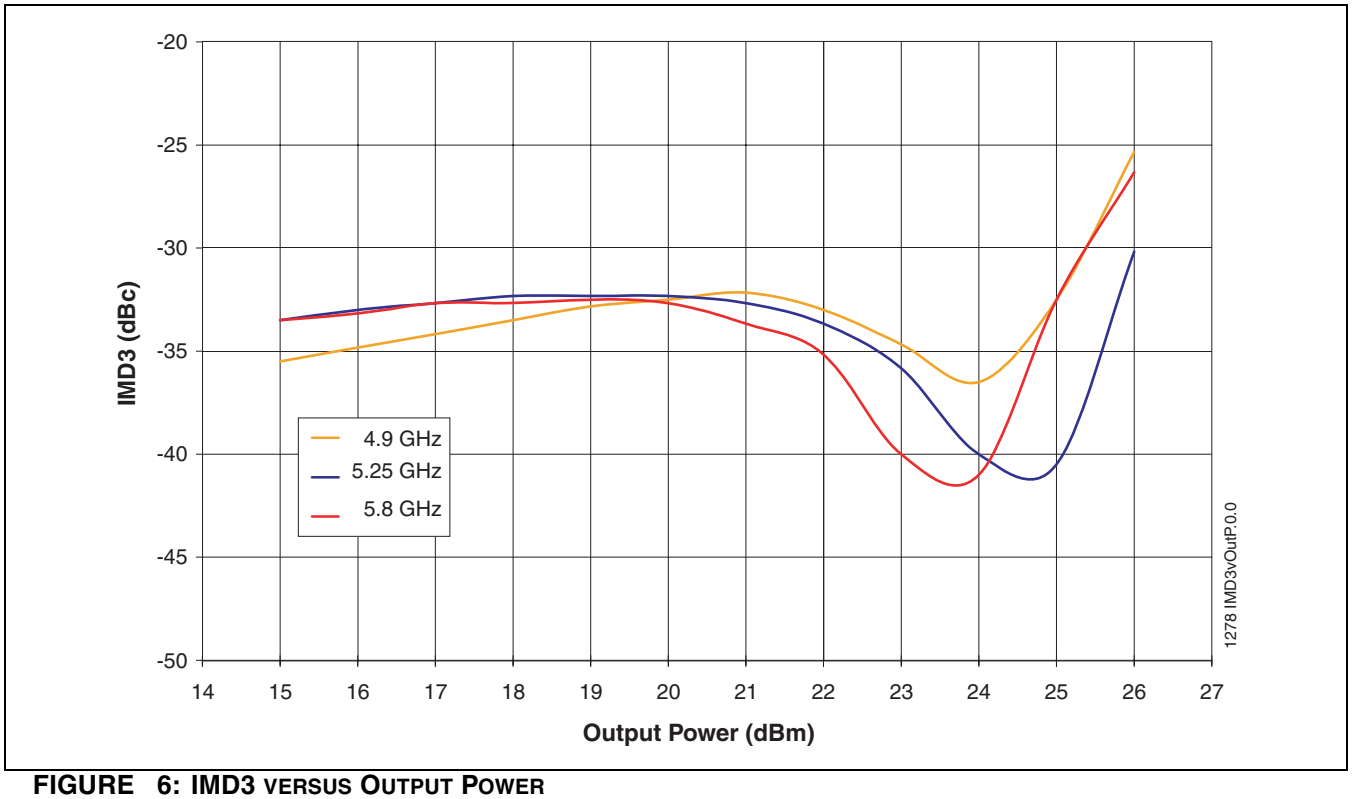


FIGURE 6: IMD3 VERSUS OUTPUT POWER

ACPR FOR 54 MBPS OFDM SIGNALS

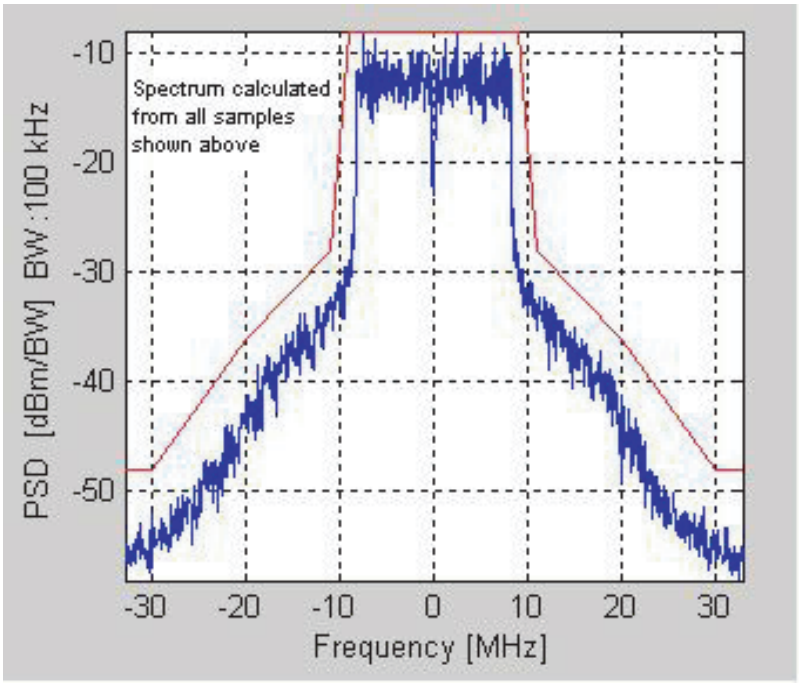


FIGURE 7: FREQUENCY = 4.9 GHZ AT P_{OUT} = 23.5 DBM WITH I_{CC} = 395 MA

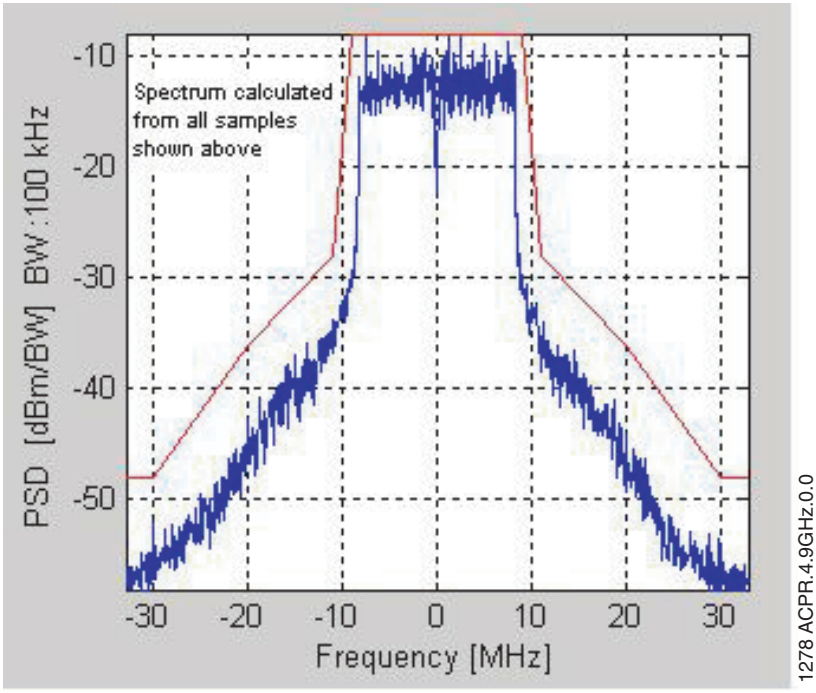


FIGURE 8: FREQUENCY = 5.18 GHZ AT P_{OUT} = 23.5 DBM WITH I_{CC} = 390 MA

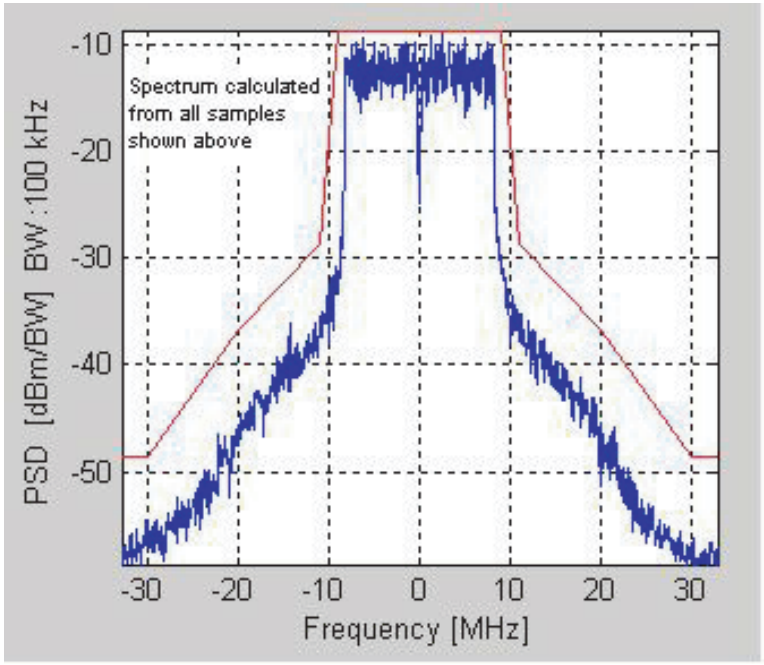


FIGURE 9: FREQUENCY = 5.32 GHZ AT P_{OUT} = 23.5 DBM WITH I_{CC} = 385 MA

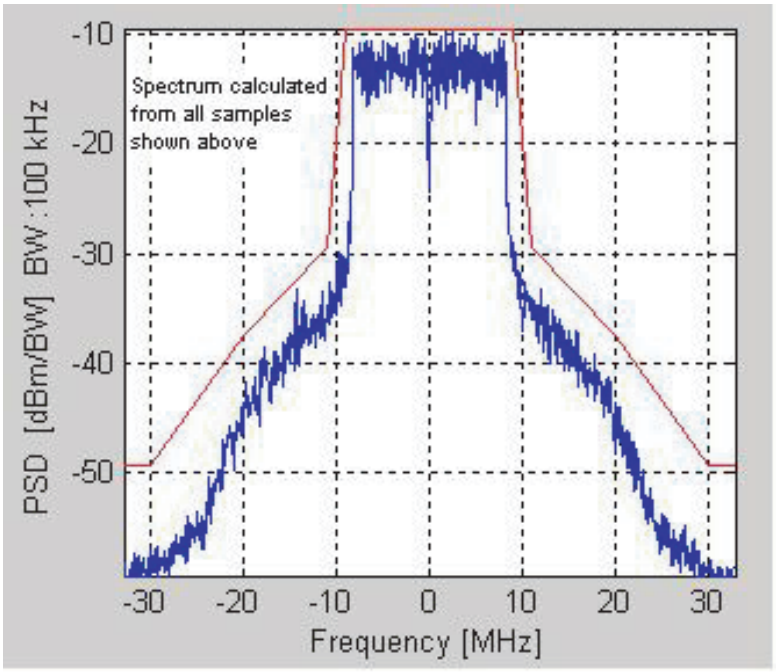


FIGURE 10: FREQUENCY = 5.8 GHZ AT P_{OUT} = 23.5 DBM WITH I_{CC} = 365 MA

EVM FOR 54 MBPS OPERATION

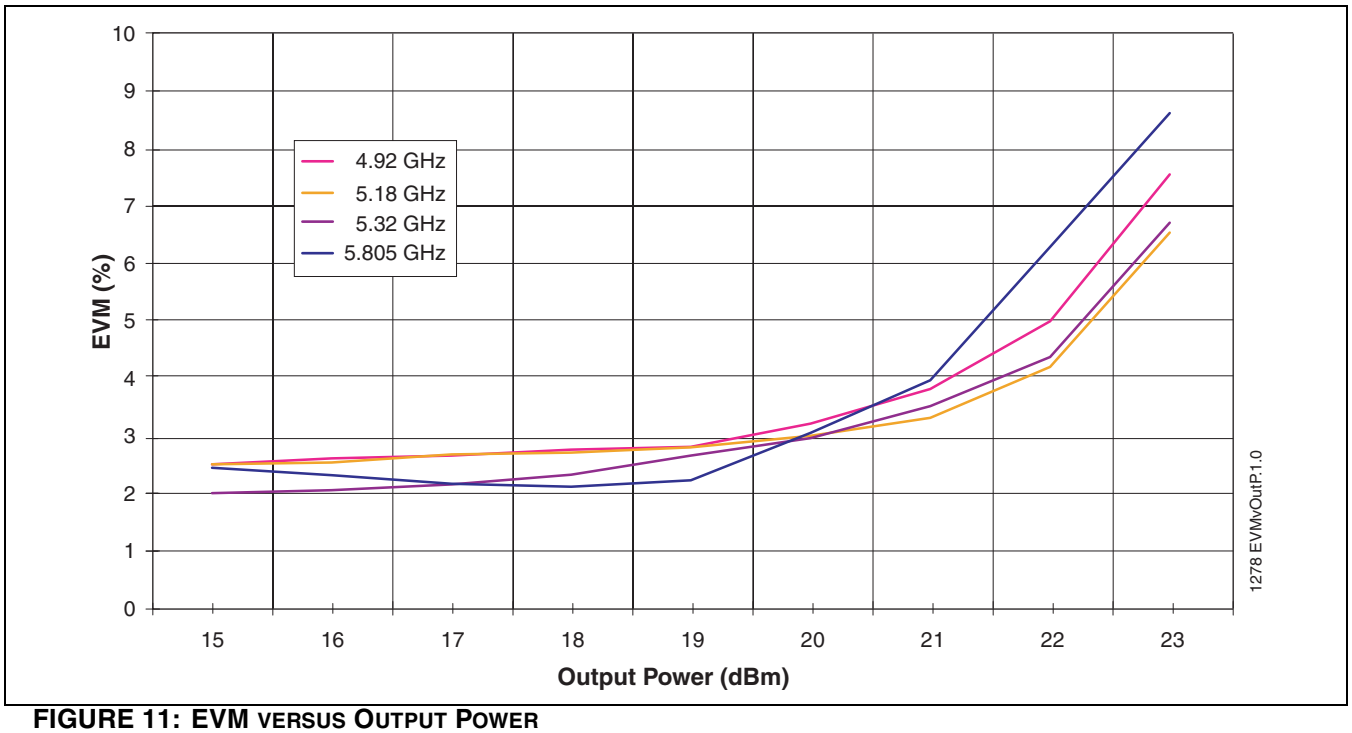


FIGURE 11: EVM VERSUS OUTPUT POWER

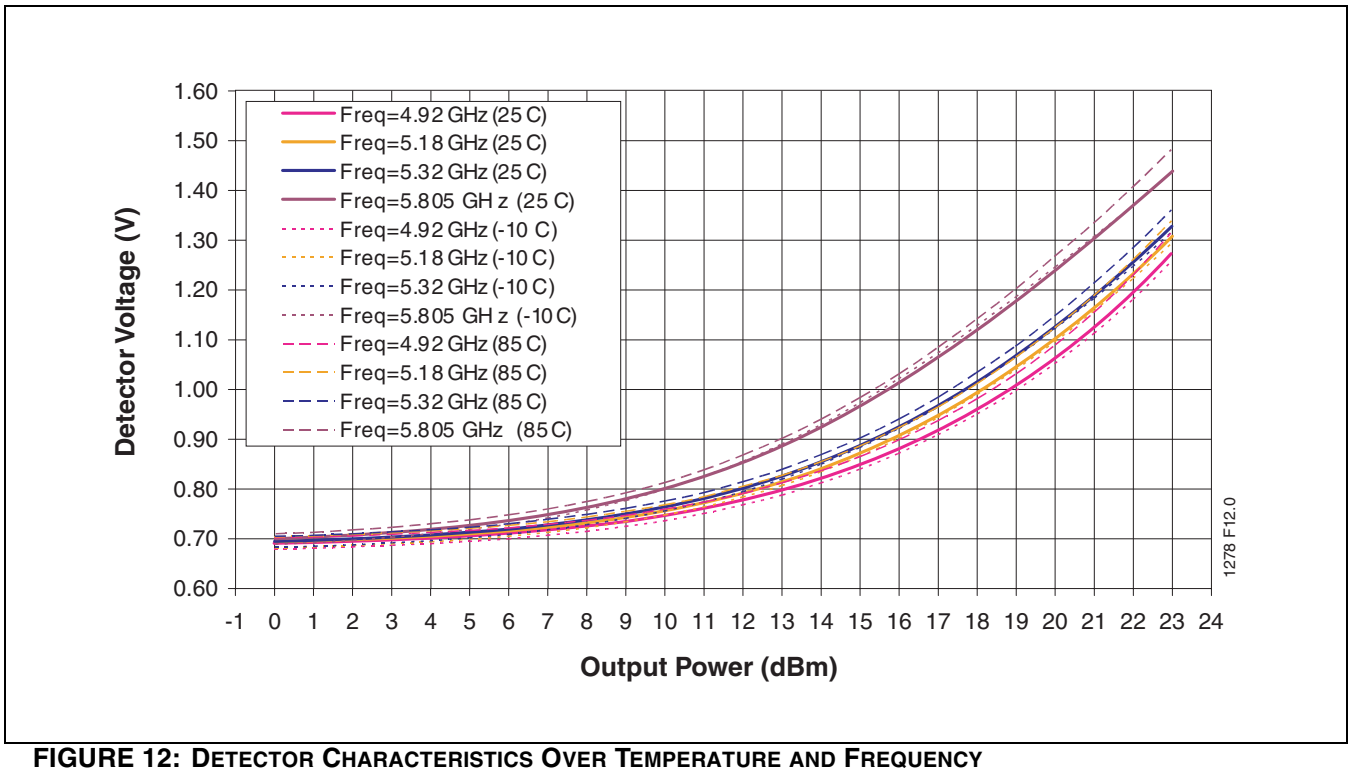


FIGURE 12: DETECTOR CHARACTERISTICS OVER TEMPERATURE AND FREQUENCY

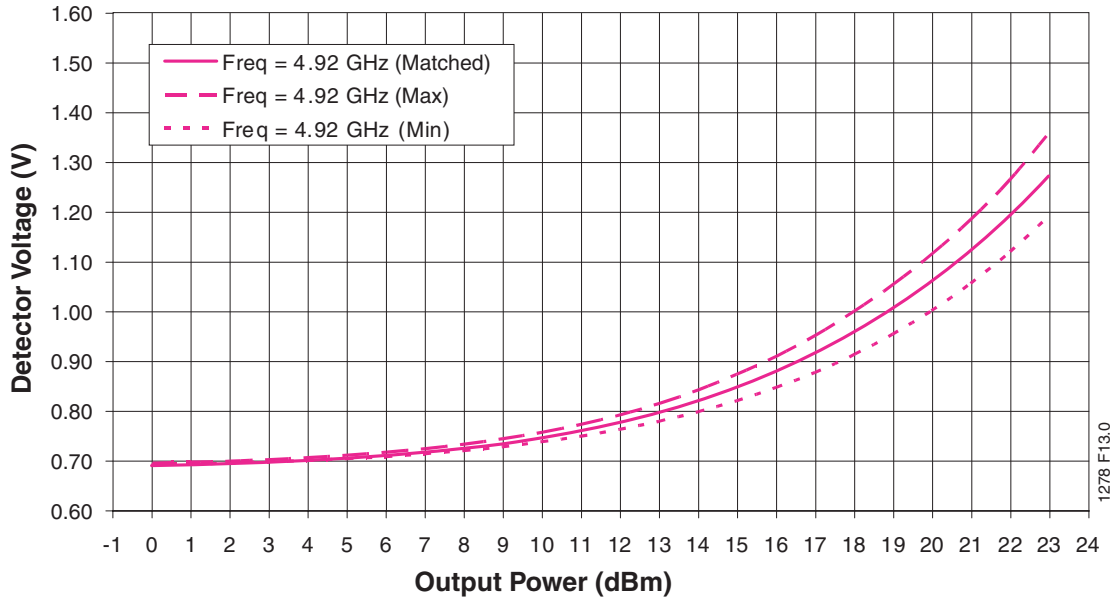


FIGURE 13: DETECTOR CHARACTERISTICS AT ROOM TEMPERATURE WITH 2:1 OUTPUT VSWR ALL PHASES AT 4.92 GHZ

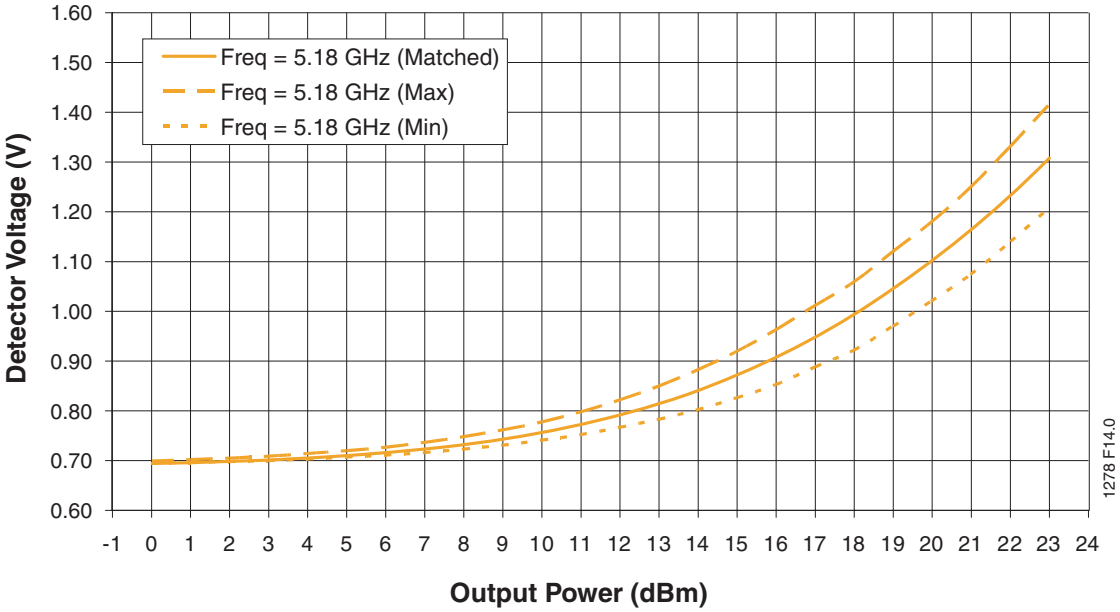


FIGURE 14: DETECTOR CHARACTERISTICS AT ROOM TEMPERATURE WITH 2:1 OUTPUT VSWR ALL PHASES AT 5.18 GHZ

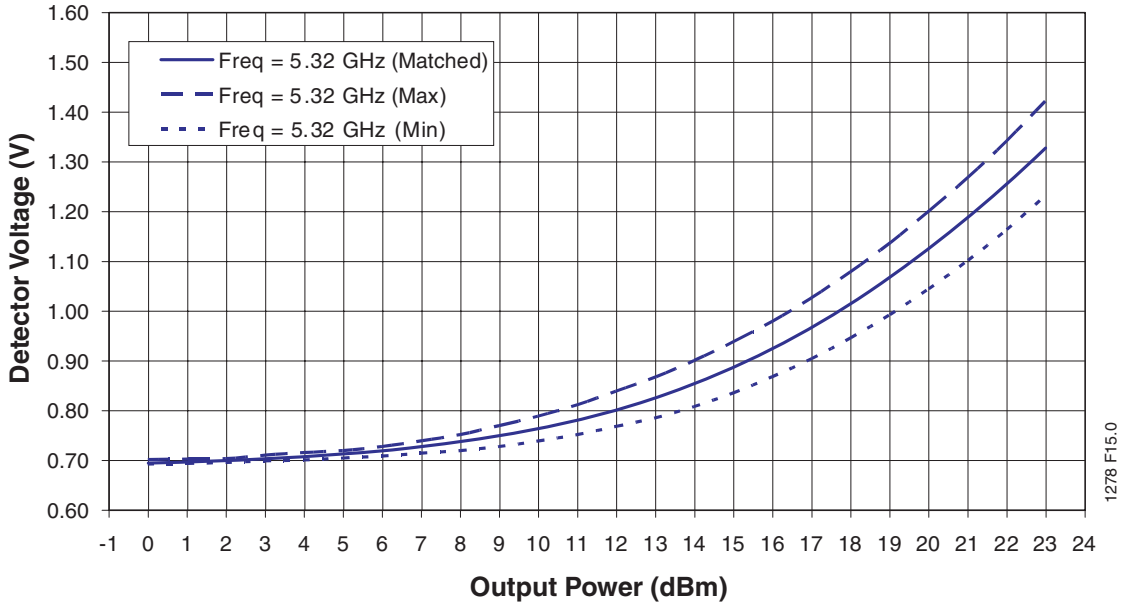


FIGURE 15: DETECTOR CHARACTERISTICS AT ROOM TEMPERATURE WITH 2:1 OUTPUT VSWR ALL PHASES AT 5.32 GHZ

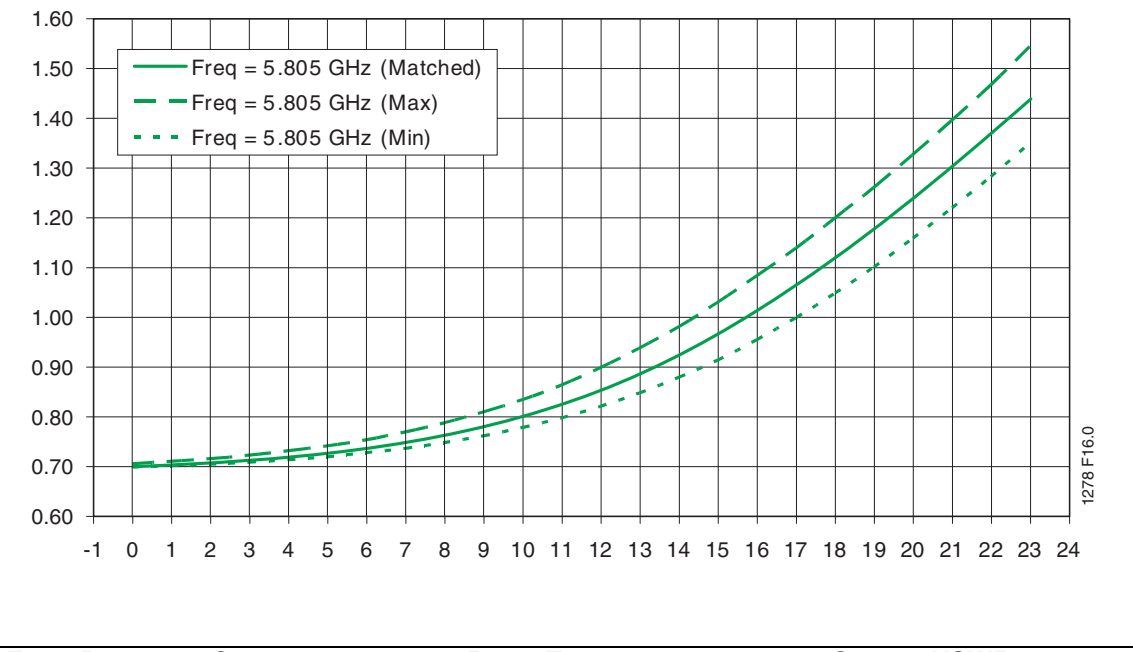


FIGURE 16: DETECTOR CHARACTERISTICS AT ROOM TEMPERATURE WITH 2:1 OUTPUT VSWR ALL PHASES AT 5.805 GHZ

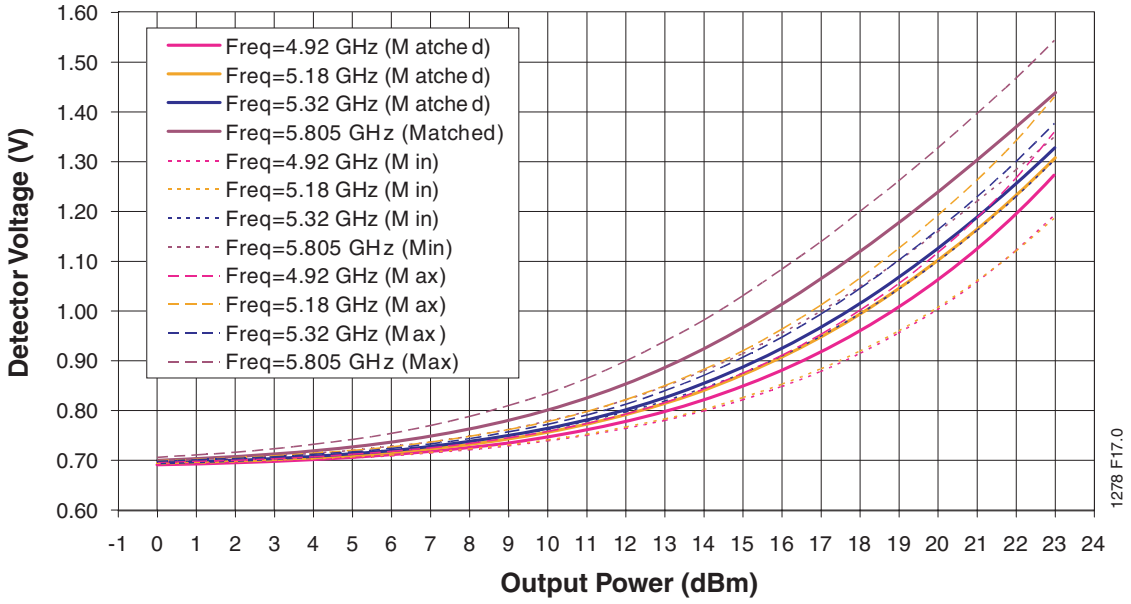


FIGURE 17: DETECTOR CHARACTERISTICS AT ROOM TEMPERATURE OVER FREQUENCY WITH 2:1 OUTPUT VSWR ALL PHASES

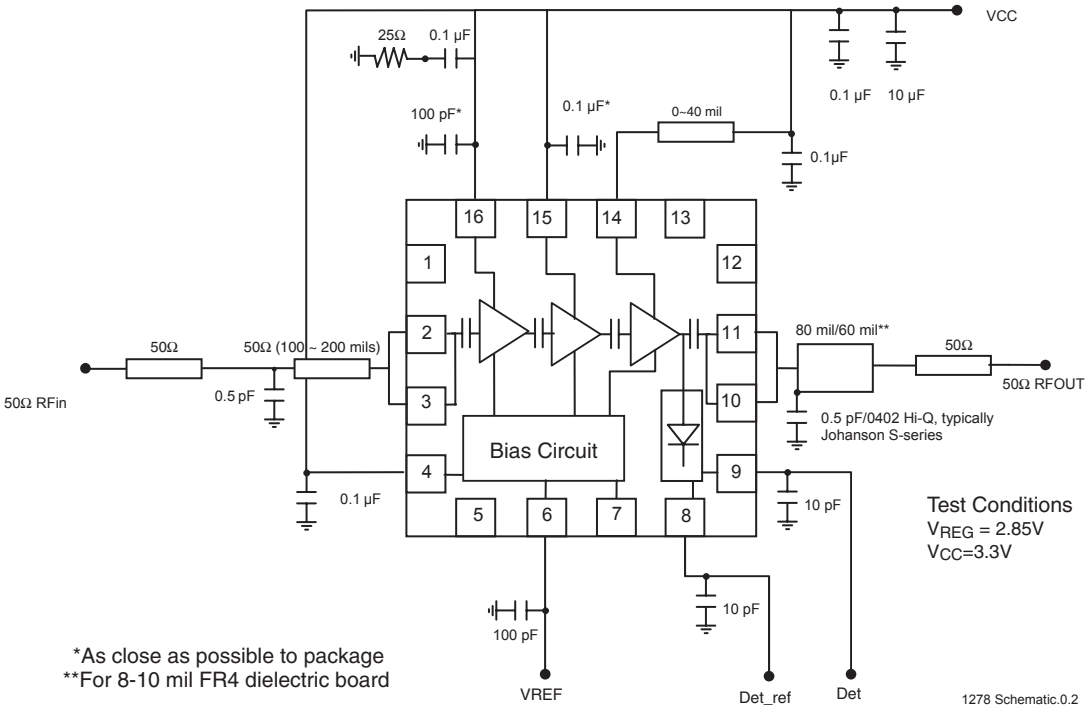
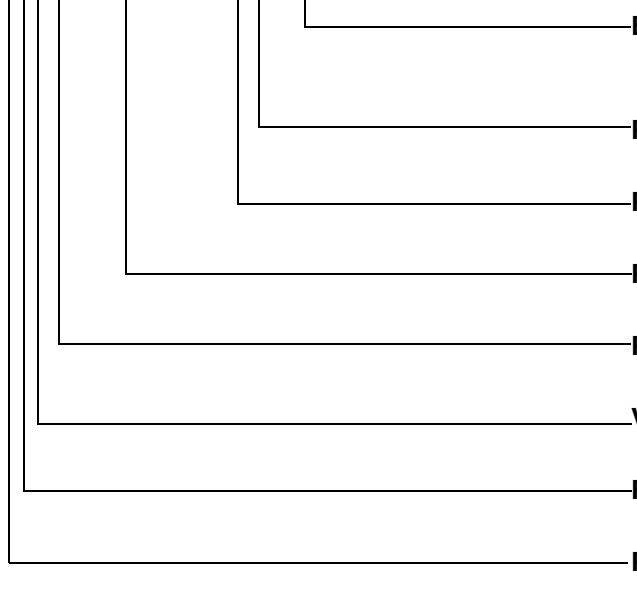


FIGURE 18: TYPICAL APPLICATION FOR HIGH-POWER 802.11A APPLICATION

PRODUCT ORDERING INFORMATION

SST11LP 12 - QC F
SSTXXLP XX - XX X



Environmental Attribute
F[1] = non-Pb / non-Sn contact (lead) finish: Nickel plating with Gold top (outer) layer

Package Modifier
C = 16 contact

Package Type
Q = WQFN

Product Family Identifier

Product Type
P = Power Amplifier

Voltage
L = 3.0-3.6V

Frequency of Operation
1 = 4.9-5.8 GHz

Product Line
1 = SST Communications

1. Environmental suffix “F” denotes non-Pb/non-SN solder. SST non-Pb/non-Sn solder devices are “RoHS Compliant”.

Valid combinations for SST11LP12

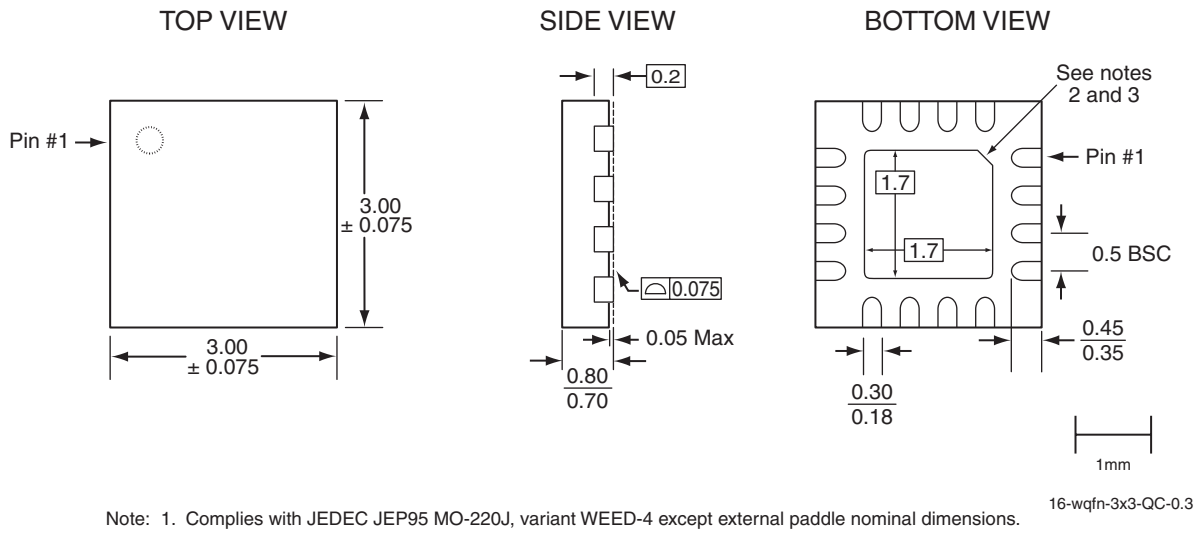
SST11LP12-QCF

SST11LP12 Evaluation Kits

SST11LP12-QCF-K

Note: Valid combinations are those products in mass production or will be in mass production. Consult your SST sales representative to confirm availability of valid combinations and to determine availability of new combinations.

PACKAGING DIAGRAMS



Note: 1. Complies with JEDEC JEP95 MO-220J, variant WEED-4 except external paddle nominal dimensions.
2. From the bottom view, the pin #1 indicator may be either a 45-degree chamfer or a half-circle notch.
3. The external paddle is electrically connected to the die back-side and possibly to certain V_{SS} leads.
This paddle can be soldered to the PC board; it is suggested to connect this paddle to the V_{SS} of the unit.
Connection of this paddle to any other voltage potential can result in shorts and/or electrical malfunction of the device.
4. Untoleranced dimensions are nominal target dimensions.
5. All linear dimensions are in millimeters (max/min).

16-CONTACT VERY-THIN QUAD FLAT NO-LEAD (WQFN)
SST PACKAGE CODE: QC

TABLE 4: REVISION HISTORY

Revision	Description	Date
00	• S71278: SST conversion of data sheet GP1112	Jan 2005
01	• Corrected the spectrum mask value in “Product Description” on page 1 to read 802.11a • Corrected the solder reflow temperature under “Absolute Maximum Stress Ratings” on page 4 • Updated sales and marketing contact information • Changed VQFN to WQFN • Updated Product Ordering information • Updated Table 3 on page 5.	Jan 2006

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