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SPF5344Z

0.8GHz to 4GHz, GaAs pHEMT 2-STAGE LOW NOISE MMIC AMPLIFIER

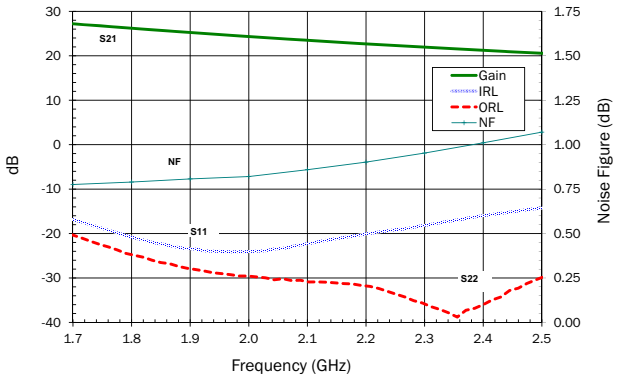
Product Description

The SPF5344Z is a high performance 2-Stage pHEMT MMIC LNA designed for use from 0.8GHz to 4GHz. It offers low noise figure and high linearity in a gain block configuration. Its single-supply operation and integrated matching networks make implementation remarkably simple. The off-chip interstage choke and DC block allow for optimum performance tuning.

Optimum Technology Matching® Applied

- ☐ GaAs HBT
- ☐ GaAs MESFET
- ☐ InGaP HBT
- ☐ SiGe BiCMOS
- ☐ Si BiCMOS
- ☐ SiGe HBT
- ☑ GaAs pHEMT
- ☐ Si CMOS
- ☐ Si BJT
- ☐ GaN HEMT
- ☐ InP HBT
- ☐ RF MEMS
- ☐ LDMOS

Gain, RL & NF versus Frequency



Features

- Low Noise Figure=0.80dB at 2.0GHz
- Gain=24.5dB at 2.0GHz
- OIP3=39dBm at 2.0GHz
- Excellent Return Loss: S11>20dB, S22>20dB at 2.0GHz
- P_{1dB}=22.4dBm at 2.0GHz
- Single-Supply Operation: 5V at Idq=120mA
- Flexible Biasing Options: 3-5V, Adjustable Current
- Broadband Internal Matching

Applications

- Cellular, PCS, W-CDMA, ISM, WiMAX Receivers
- PA Driver Amplifier
- Low Noise, High Linearity Gain Block Applications

Parameter	Frequency=0.9GHz			Frequency=2.0GHz			Frequency=2.2GHz			Unit	Condition
	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.		
Small Signal Power Gain		34.5		22.1	24.5	26.9		22.5		dB	
Noise Figure		0.70			0.80			0.90		dB	
Output Third Order Intercept Point		35.5		35	39.0			39.0		dBm	
Output Power at 1dB Compression		21.8			22.4			22.7		dBm	
Input Return Loss					25.0					dB	
Output Return Loss					25.0					dB	
Reverse Isolation					32.5					dB	
Device Operating Voltage		5.0			5.0			5.0		V	
Device Operating Current (Quiescent)	100	120	160	100	120	160	100	120	160	mA	
Thermal Resistance (junction-to-lead) 1st stage		65			65			65		°C/W	
Thermal Resistance (junction-to-lead) 2nd stage		65			65			65		°C/W	

Note: V_D=5.0V, I_{DQ}=120mA OIP_3 Tone Spacing=1MHz, P_{OUT} per tone=0dBm and $Z_S=Z_L$=50Ω, 25°C, Application Circuit Data.
The typical noise figure values include evaluation board losses.

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Absolute Maximum Ratings

Parameter	Rating	Unit
Max Device Current (I_D)	220 (100mA 1st stage, 120mA 2nd stage)	mA
Max Device Voltage (V_D)	5.5	V
Max RF Input Power* (See Note)	24	dBm
Max Dissipated Power	1200	mW
Max Junction Temperature (T_J)	150	°C
Operating Temperature Range (T_L)	-40 to + 85	°C
Max Storage Temperature	-65 to +150	°C
ESD Rating - Human Body Model (HBM)	Class 1B	
Moisture Sensitivity (MSL)	MSL 1	

*Note: Load condition 1, $Z_L = 50\Omega$;
Load condition 2, $Z_L = 10{:}1$ VSWR

Operation of this device beyond any one of these limits may cause permanent damage. For reliable continuous operation, the device voltage and current must not exceed the maximum operating values specified in the table on page one.
Bias Conditions should also satisfy the following expression:
$I_D V_D < (T_J - T_L)/R_{TH}$, j-l and T_L = Source Lead Temperature

Caution! ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

RFMD Green: RoHS compliant per EU Directive 2002/95/EC, halogen free per IEC 61249-2-21, < 1000ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

Typical RF Performance - $V_D = 5.0$V (Application Circuit Data)

			Frequency (GHz)								
Symbol	Parameter	Unit	0.8	0.85	0.9	1.8	1.9	2.0	2.1	2.2	2.5
S_{21}	Small Signal Gain	dB	36.5	35.5	34.5	26.0	25.5	24.5	23.5	22.5	20.5
NF	Noise Figure	dB	0.6	0.7	0.7	0.8	0.8	0.8	0.9	0.9	1.1
OIP_3	Output IP3	dBm	35.0	35.5	35.6	39.0	39.0	39.0	39.5	39.0	39.0
P1dB	Output P1dB	dBm	21.5	21.6	21.8	22.6	23.1	22.4	23.0	22.7	22.6
S_{11}	Input Return Loss	dB	17.0	22.0	25.0	22.5	25.0	25.0	23.0	20.5	14.5
S_{22}	Output Return Loss	dB	15.0	19.5	23.5	25.0	25.0	25.0	25.0	25.0	25.0
S_{12}	Reverse Isolation	dB	44.0	43.5	43.5	34.0	33.0	32.5	32.0	31.0	29.5

Test Conditions: $V_D = 5.0$V, $I_{DQ} = 120$mA, OIP_3 Tone Spacing = 1MHz, P_{OUT} per tone = 0dBm, $T_L = 25°C$, $Z_S = Z_L = 50\Omega$

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Pin	Function	Description
1,2,4,5,7,8,9, 11,12,14,15, 16,18,20	N/A	Ground or No-Connect. No connection internal
3	RF IN	RF Input, VG1 applied through this pin.
6	RF/DC	Connected internally to RF IN (VG1). External No-Connect required.
10	RF/DC	Connected internally to RF OUT (VD2). External No-Connect required.
13	RF OUT	RF Output, VD2 applied through this pin.
17	RF/VG2	RF/DC input of stage 2, VG2 applied through this pin.
19	RF/VD1	RF/DC output of stage 1, VD1 applied through this pin.
EPAD	GND	EPAD must be conductively attached to RF and DC ground.

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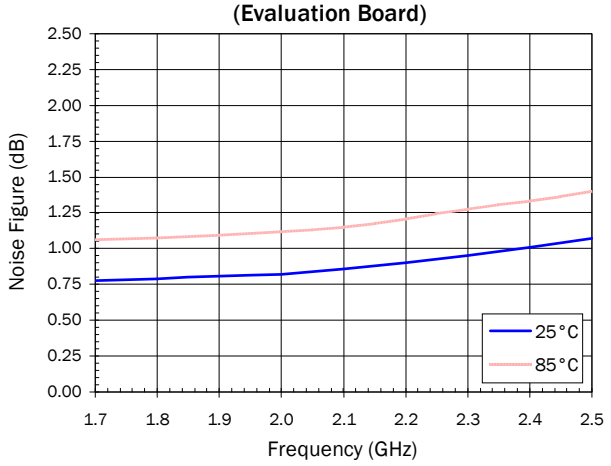
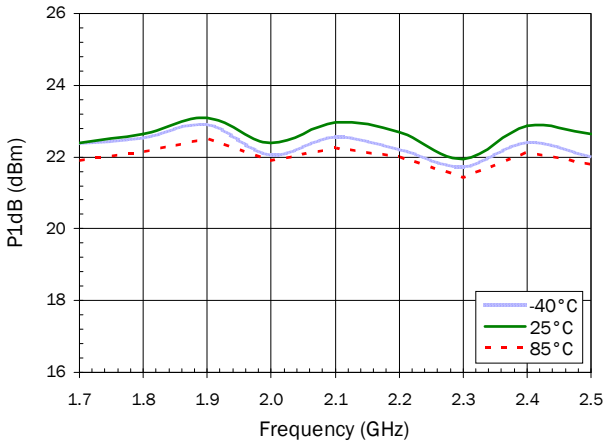
Typical RF Performance - 1.7GHz to 2.5GHz Application Circuit with V_D=5V, I_D=120mA

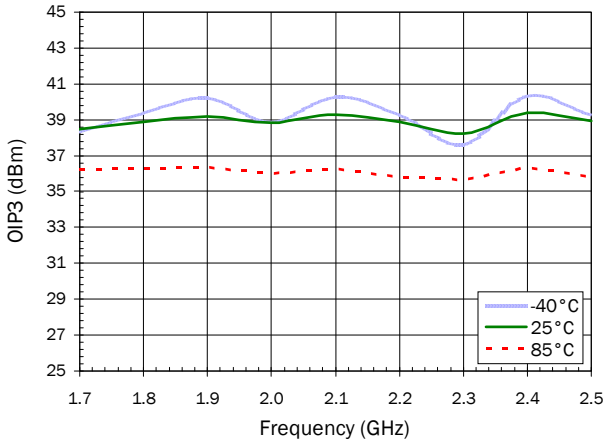
Noise Figure versus Frequency (Evaluation Board)



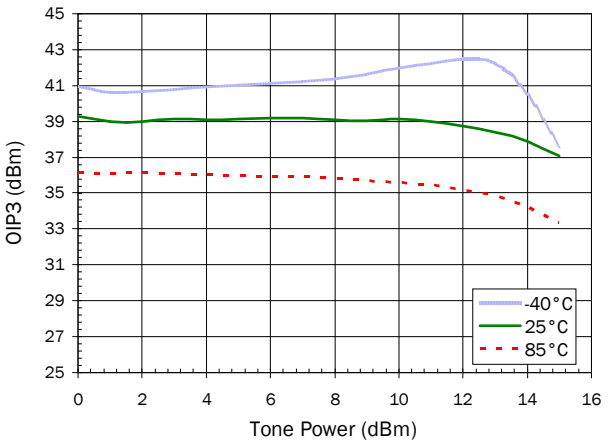
P1dB versus Frequency



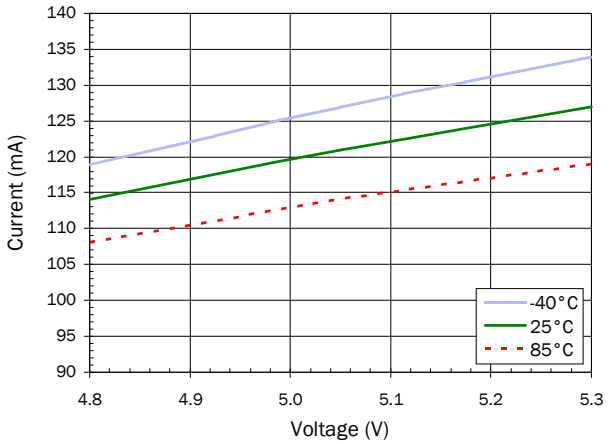
OIP3 versus Frequency (0dBm tones)



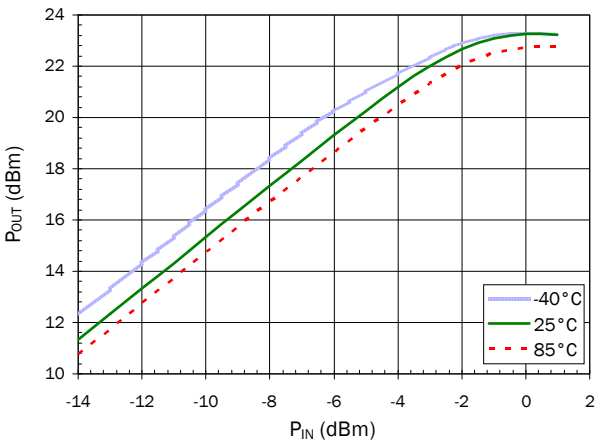
OIP3 versus Tone Power Out (1.9GHz)



Current versus Voltage



P_{OUT} versus P_{IN} (1.9GHz)



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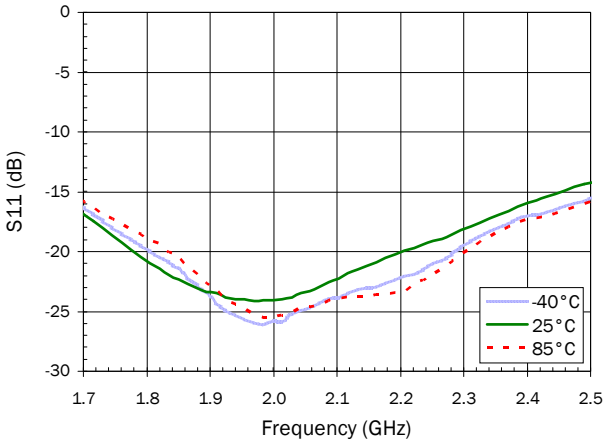
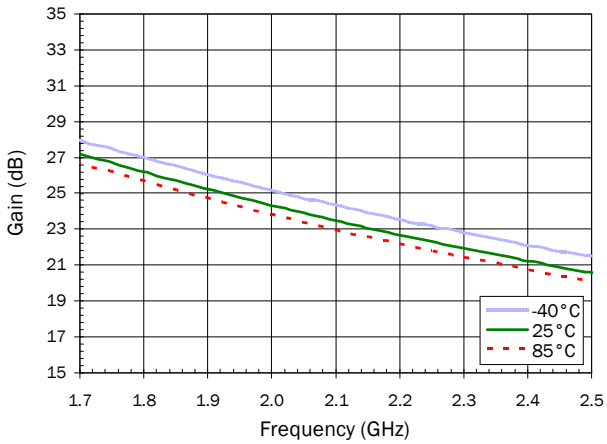
Typical RF Performance - 1.7GHz to 2.5GHz Application Circuit with V_D=5V, I_D=120mA

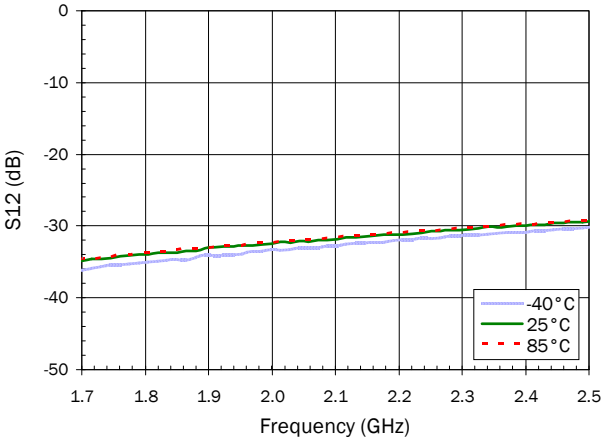
S11 versus Frequency



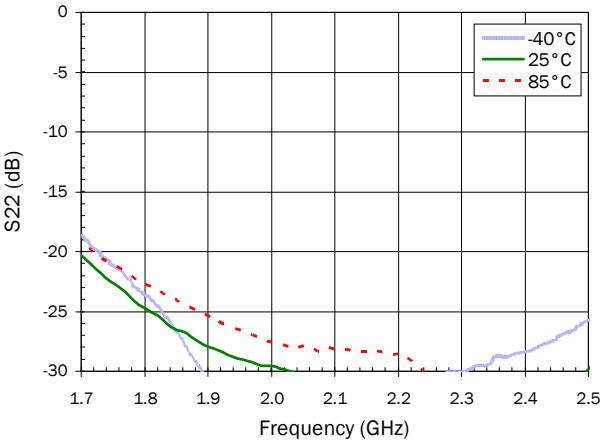
S21 versus Frequency



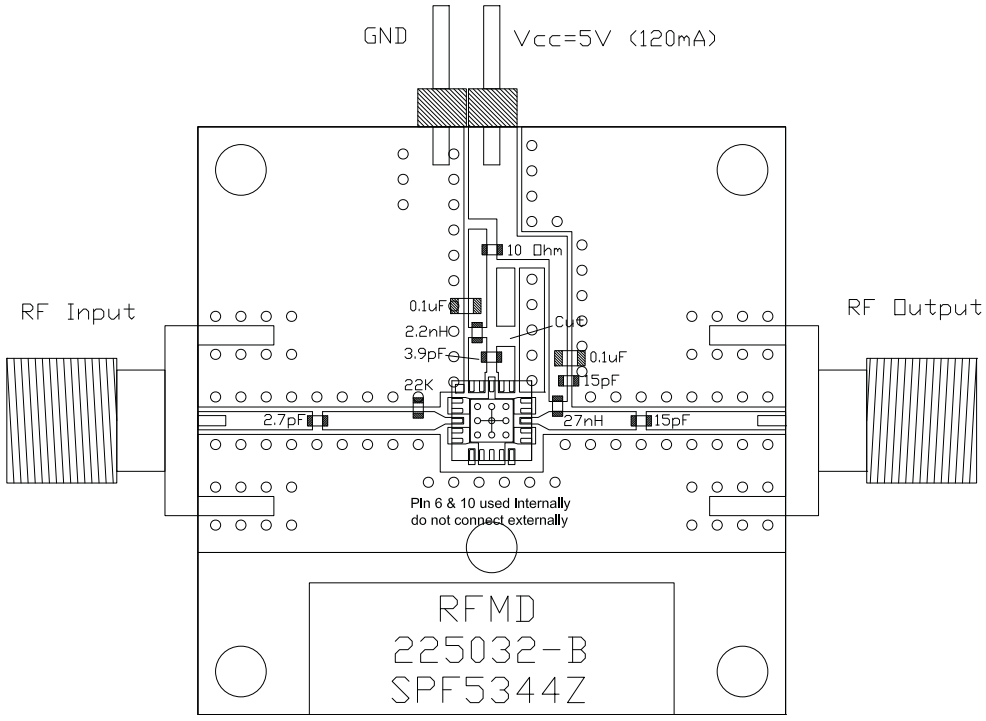
S12 versus Frequency



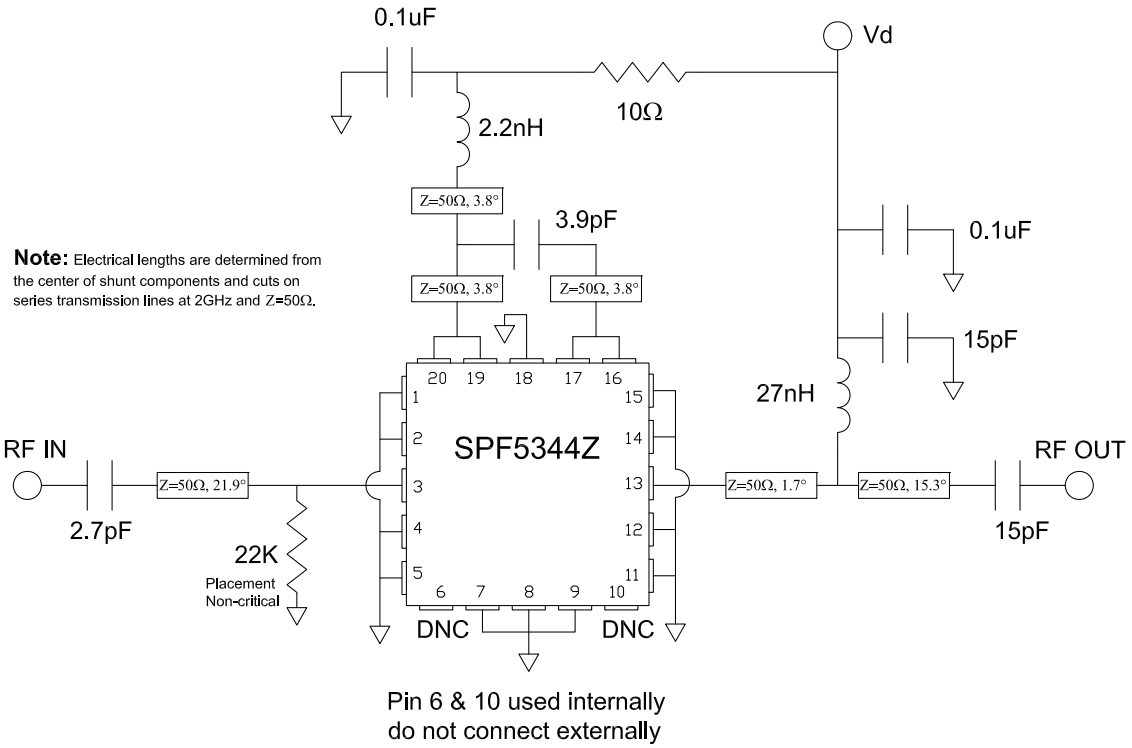
S22 versus Frequency



1.7GHz to 2.5GHz Evaluation Board Layout and Bill of Materials



1.7GHz to 2.5GHz Application Schematic



Note: Electrical lengths are determined from the center of shunt components and cuts on series transmission lines at 2GHz and Z=50Ω.

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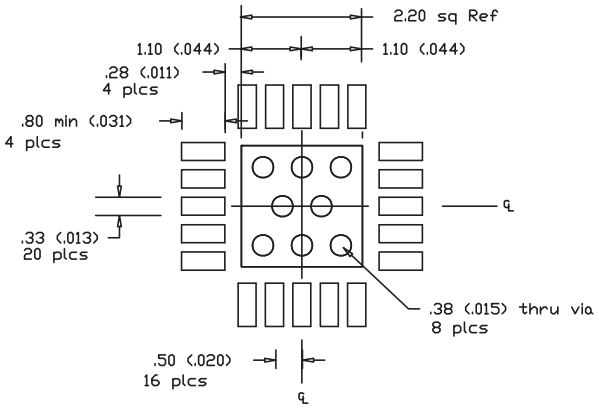
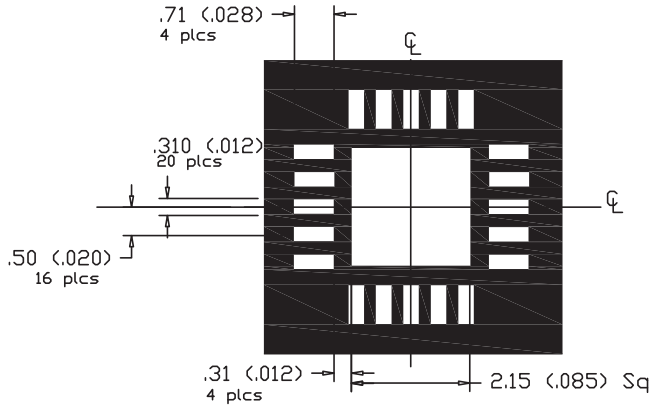
Suggested Land Pattern

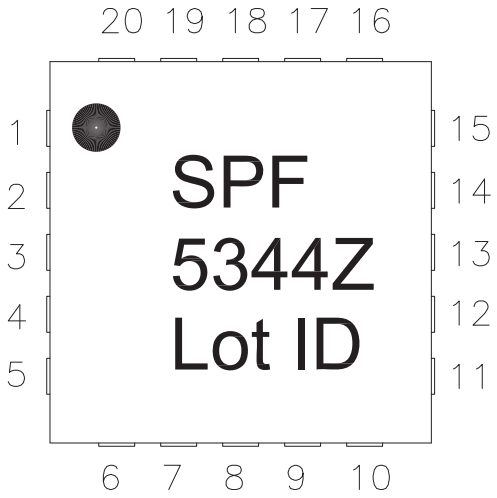


- Generic Land Pattern -



- Generic Solder Mask Opening -

Part Identification



Alternate Marking: 53Z versus 5344Z

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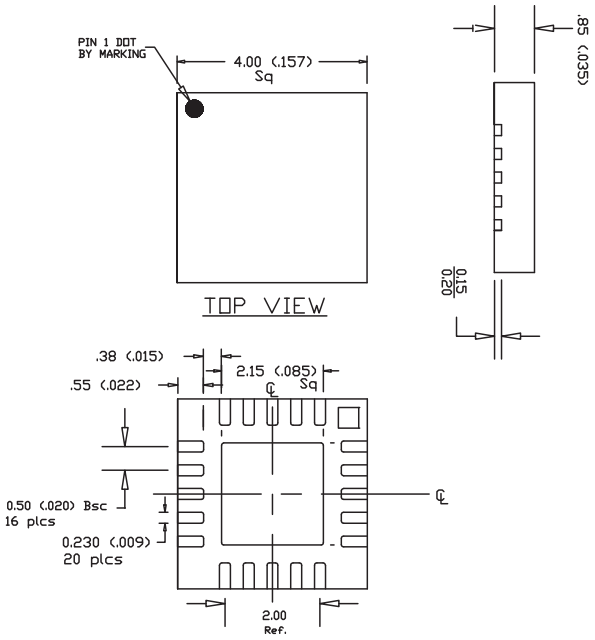
Package Drawing



OOrdering Information

Part Number	Description
SPF5344Z	13" Reel with 3000 pieces
SPF5344ZSQ	Sample Bag with 25 pieces
SPF5344ZSR	7" Reel with 100 pieces
SPF5344ZPCK1	1700MHz to 2500MHz PCBA with 5-piece Sample Bag

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