

RG512

500-4000MHz

High Linearity 3V Gain Block Amplifier

Product Description

RG512 is a low current and low noise Gain Block Amplifier in a low-cost surface mount package and provides 30dBm high OIP3 and 1.62dB Noise Figure at 1900MHz. It is fabricated on a compound semiconductor material and conventional device technology. RG512 is available in a lead-free / green / RoHS-compliant SOT363(SC70) package. The performance is targeted for use as a receiver and transmitter in wireless infrastructure system where high linearity and low noise is required. Internal active bias circuitry allows RG512 to maintain high linearity and gain performance over temperature and operate directly off a single +3V supply. All devices are 100% RF and DC tested and internally matched to 50 ohms without additional external components.

Features

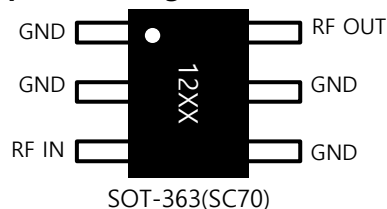
- High OIP3 30dBm at 1900MHz
- 18.9dB Gain at 900MHz
- P1dB=20dBm at 1900MHz
- 1.62dB Noise Figure at 1900MHz
- Unconditionally stable
- Single 3.3V supply, 27mA current
- No dropping resistor required
- Industry standard SOT363(SC70) package
- Lead-free, RoHS compliant, Green



Applications

- Broadband Gain Block
- Wireless infrastructure
- Cellular, PCS, GSM, WCDMA, WiBro, LTE

Component Diagram



Parameter	Specification			Condition	Units
	Min.	Typ.	Max.		
Small Signal Gain	17.4	18.9		900MHz	dB
	12.7	14.2		1900MHz	dB
	11.0	13.5		2140MHz	dB
Output power at 1-dB Compression	18.5	20.0		1900MHz	dBm
	19.0	20.6		2140MHz	dBm
Third Order Intercept Point	23.7	25.7		1900MHz	dBm
	28.3	30.3		2140MHz	dBm
Input Return Loss		-22.1		1900MHz	dB
Output Return Loss		-16.8		1900MHz	dB
Reverse Isolation		-22.5		1900MHz	dB
Noise Figure		1.62		1900MHz	dB
Device Voltage		3.3			V
Device current (Icq)	17	27			mA
Thermal Resistance		41.6		Junction to lead	°C/W

Test condition: Vcc=3.3V, I_b=27mA Typ., OIP₃ Tone Spacing=1MHz, P_{out} per tone=6dBm T_L=25°C, Z_s=Z_L=50

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Absolute Maximum Ratings

Parameter	Rating	Unit
Max Device Voltage(V_D)	5.0	V
Max Device Current(I_D)	60	mA
Max RF Input Power	10	dBm
Max Operating Dissipated Power	0.3	W
Junction Temperature(T_J)	+150	°C
Operating Temperature(T_L)	-40 to +85	°C
Storage Temperature	-65 to +150	°C
ESD Sensitivity(HBM)	Class 1B	
Moisture Sensitivity Level	MSL1	



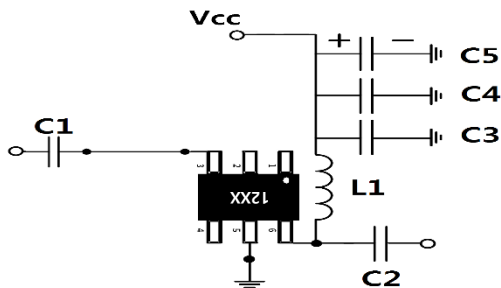
Typical Electrical Specification

Parameter	700MHz	900MHz	1900MHz	2140MHz	2650MHz	Unit
S21	19.2	18.9	14.2	13.5	11.7	dB
OIP3	24.0	25.7	30.0	30.3	31.4	dBm
P1dB	15.0	17.0	20.0	20.6	21.6	dBm
S11	-8.8	-14.4	-22.1	-19.8	-17.7	dB
S22	-7.7	-10.7	-16.8	-17.0	-16.3	dB
S12	-28.2	-25.9	-22.5	-22.3	-21.4	dB
NF	1.65	1.62	1.62	1.63	1.65	dB

Test condition: $V_{CC}=3.3V$, $I_D=27mA$ Typ., OIP₃ Tone Spacing=1MHz, P_{out} per tone=6dBm $T_L=25^{\circ}C$, $Z_S=Z_L=50$

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700~900MHz Reference Application Circuit



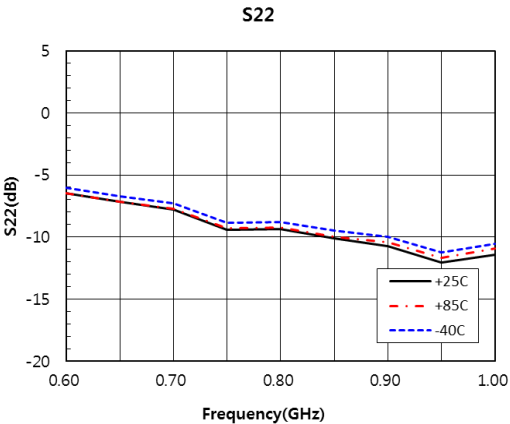
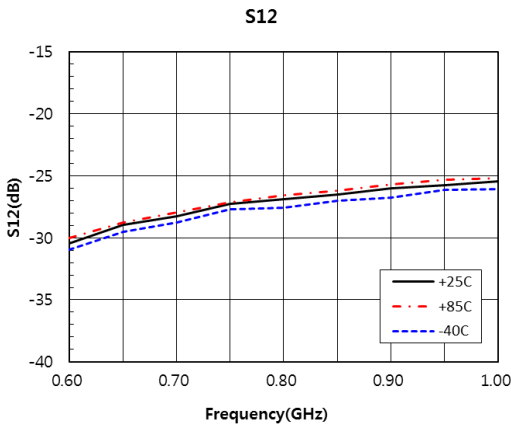
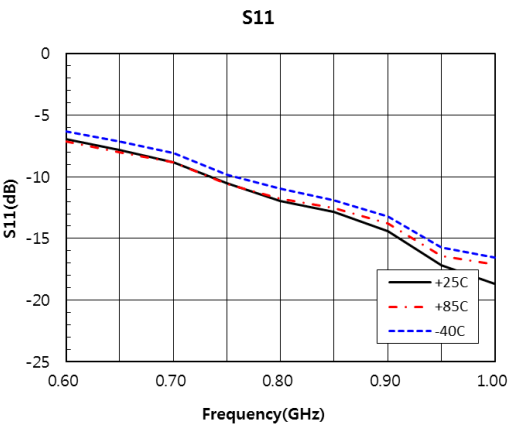
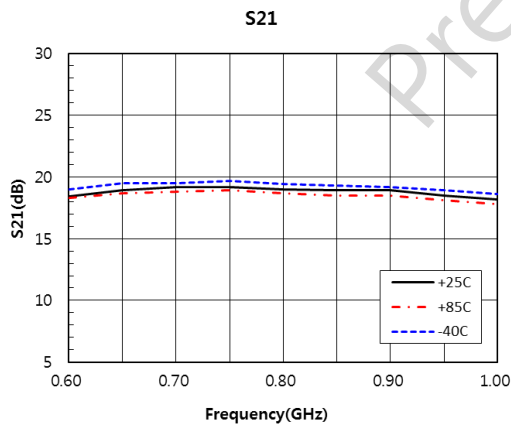
BOM	Value	BOM	Value	BOM	Value
C1	100pF	C4	1000pF	L1	22nH
C2	100pF	C5	10uF		
C3	100pF				

*Width and Length of Micro-strip line dimension in mm[mil]

Parameter/Freq.(MHz)	700	800	900	Unit
Small Signal Gain	19.2	19.0	18.9	dB
S11	-8.8	-11.9	-14.4	dB
S22	-7.7	-9.3	-10.7	dB
Output P1dB	15	16.8	17	dBm
Output OIP3*	24.0	25.0	25.7	dBm
Noise Figure	1.65	1.64	1.62	dB
Icq	27			mA
Vcc	3.3			V

* Pout=6dBm/tone

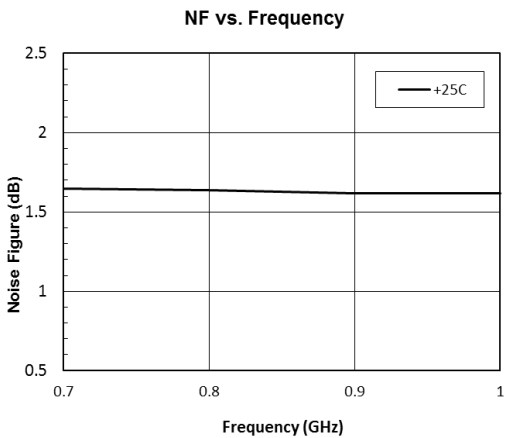
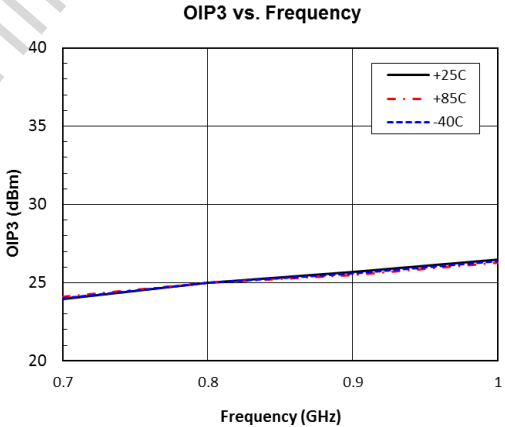
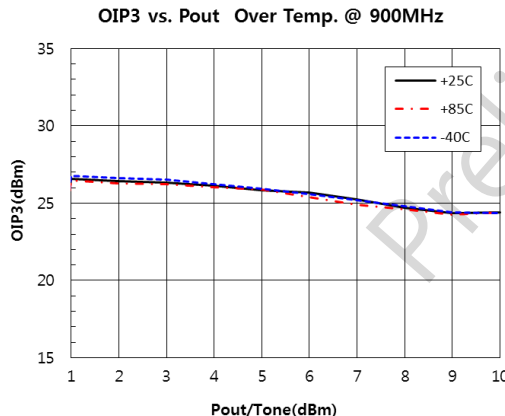
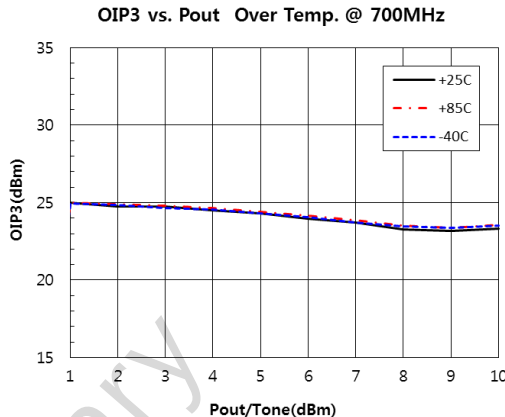
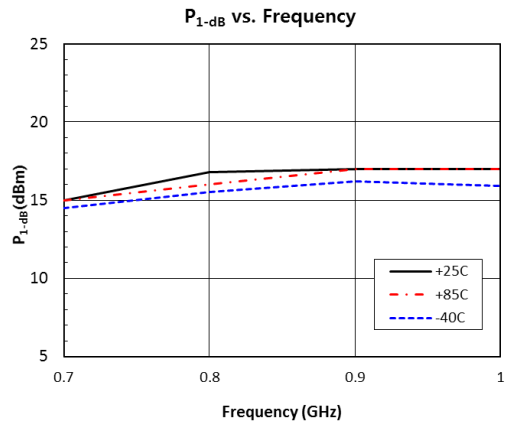
S-Parameter Over Temperature vs. Freq. at 700~900MHz



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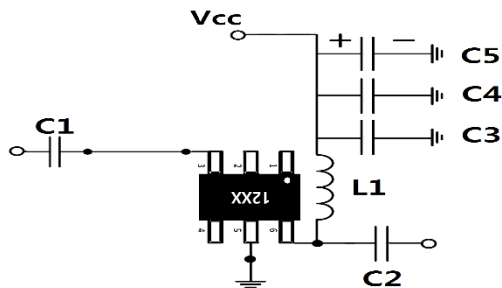
P1dB, OIP3 and Noise Figure Performance at 700~900MHz



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1800~2200MHz Reference Application Circuit



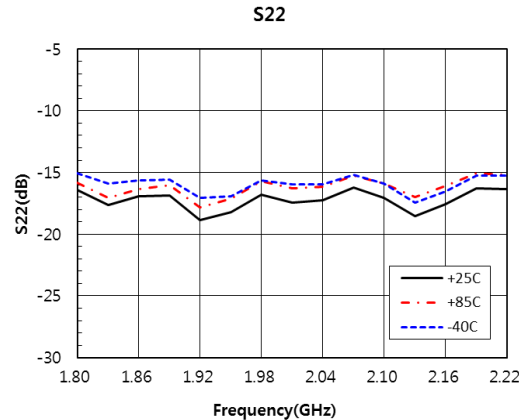
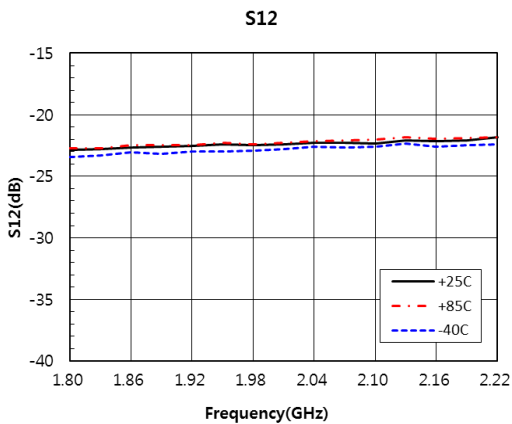
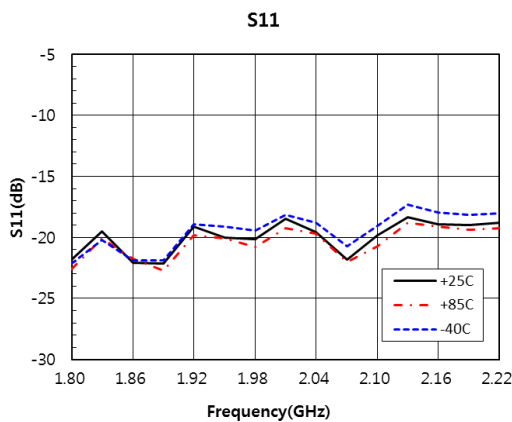
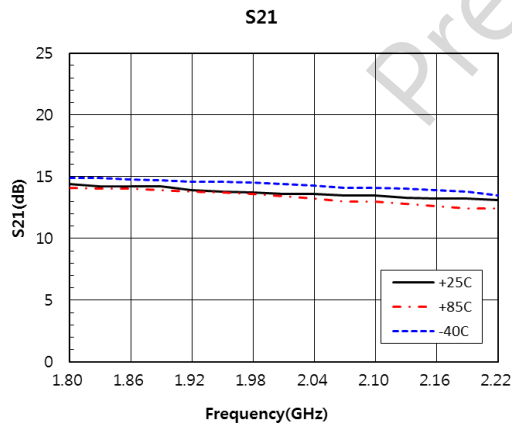
BOM	Value	BOM	Value	BOM	Value
C1	100pF	C4	1000pF	L1	10nH
C2	100pF	C5	10uF		
C3	100pF				

*Width and Length of Micro-strip line dimension in mm[mil]

Parameter/Freq.(MHz)	1800	1900	2140	Unit
Small Signal Gain	14.4	14.2	13.5	dB
S11	-21.8	-22.1	-19.8	dB
S22	-16.3	-16.8	-17.0	dB
Output P1dB	19.5	20.0	20.6	dBm
Output OIP3*	29.9	30.0	30.3	dBm
Noise Figure	1.62	1.62	1.63	dB
Icq	27			mA
Vcc	3.3			V

* Pout=6dBm/tone

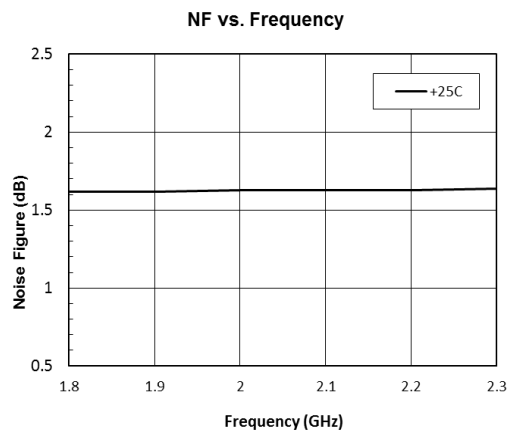
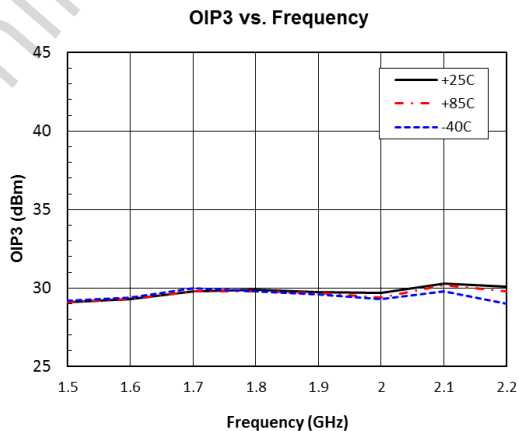
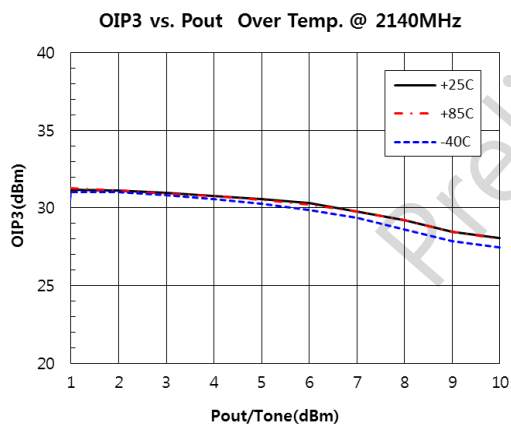
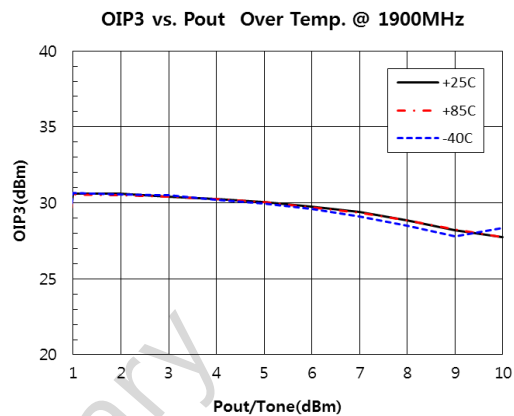
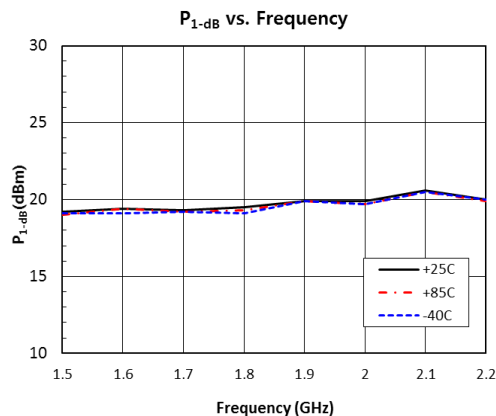
S-Parameter Over Temperature vs. Freq. at 1800~2200MHz



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P1dB, OIP3 and Noise Figure Performance at 1800~2200MHz

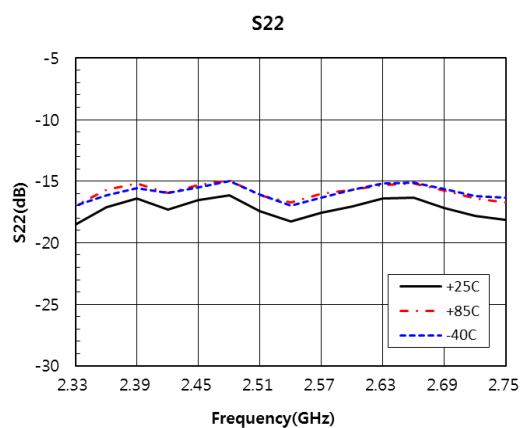
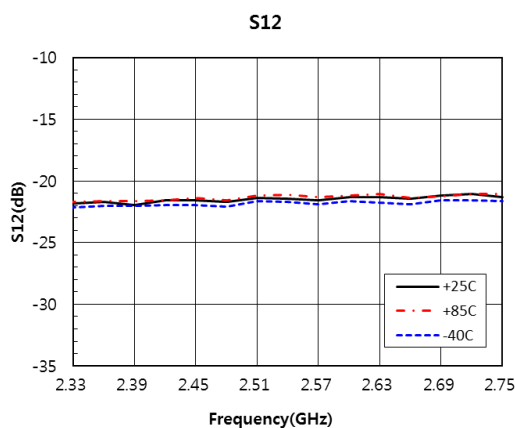
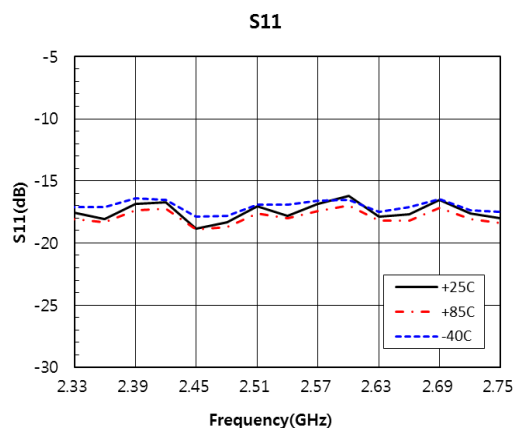
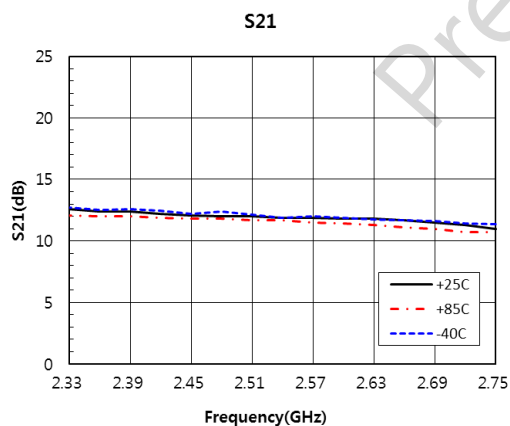


ARDTECH
ADVANCED RADIO DEVICE

BOM	Value	BOM	Value	BOM	Value
C1	100pF	C4	1000pF	L1	10nH
C2	100pF	C5	10uF		
C3	100pF				

Parameter/Freq.(MHz)	2300	2650	2750	Unit
Small Signal Gain	12.7	11.7	11.0	dB
S11	-18.4	-17.7	-18.0	dB
S22	-16.9	-16.3	-18.1	dB
Output P1dB	20.3	21.5	21.6	dBm
Output OIP3*	31.0	31.4	31.2	dBm
Noise Figure	1.64	1.65	1.66	dB
Icq	27			mA
Vcc	3.3			V

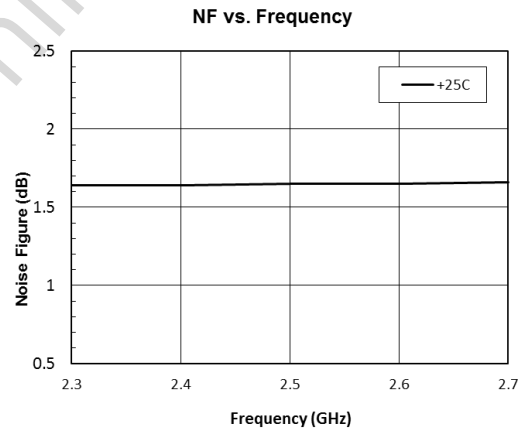
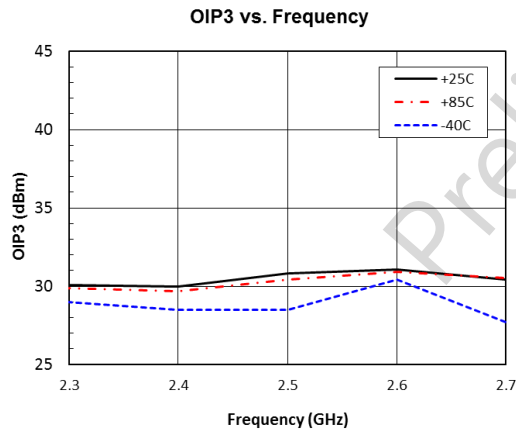
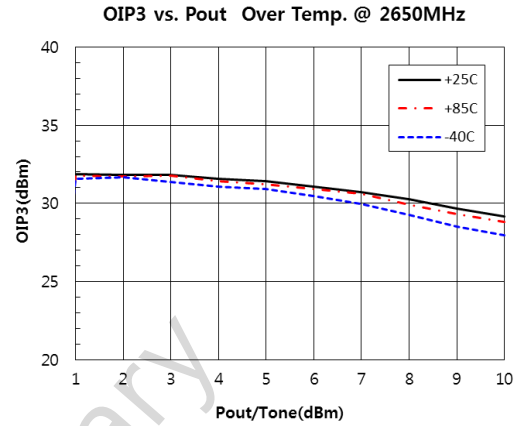
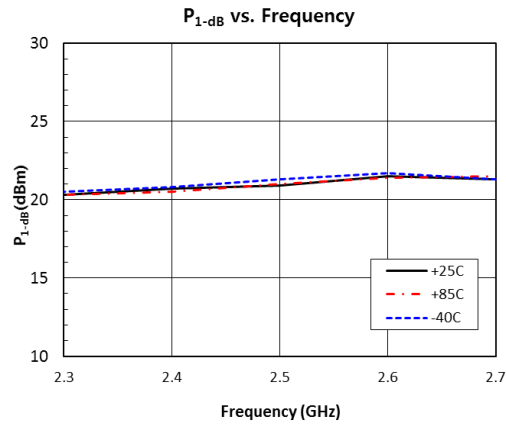
S-Parameter Over Temperature vs. Freq. at 2300~2700MHz



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P1dB, OIP3 and Noise Figure Performance at 2300~2700MHz

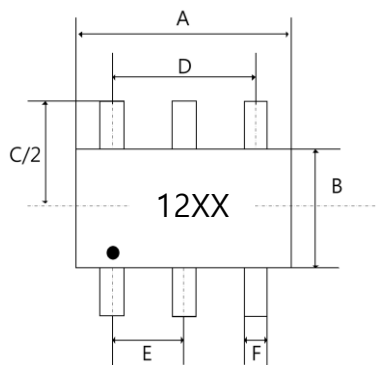


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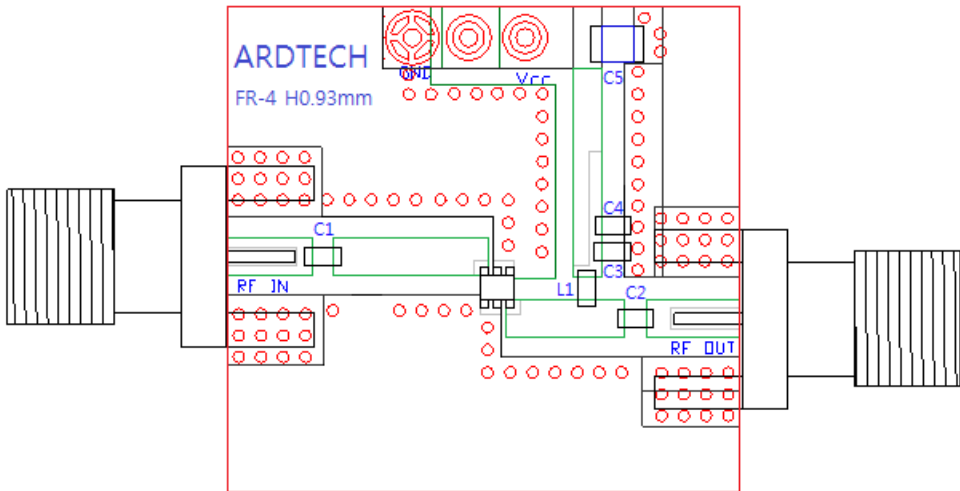


Package Mark and Dimensions



Symbol	DIMENSIONS MILLIMETER			DIMENSIONS INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.90	2.10	2.15	0.074	0.082	0.084
B	1.15	1.25	1.35	0.045	0.050	0.055
C	2.00	2.10	2.20	0.078	0.082	0.086
D	1.3			0.0512		
E	0.65			0.0255		
F	0.15	-	0.30	0.006	-	0.012

Evaluation PCB Layout



PCB Substrate Information[mm]	
Dielectric Constant	FR-4/4.6
Dielectric Height	0.037[0.93]
Copper Thickness	1 oz.