BGS2

50-4000 MHz SILICON GERMANIUM Gain Block

Preliminary Datasheet

Device Features

- Single Fixed 3V supply
- No Dropping Resistor Required
- No matching circuit needed
- Lead-free/Green/RoHS compliant SOT-363 package
- Application: Driver Amplifier, Cellular, PCS, GSM, UMTS, WCDMA, Wireless Data

Part Marking (X: Wafer number)

Pin Description	
RF IN	3
RF OUT	6
GND	1,2,4,5

Product Description

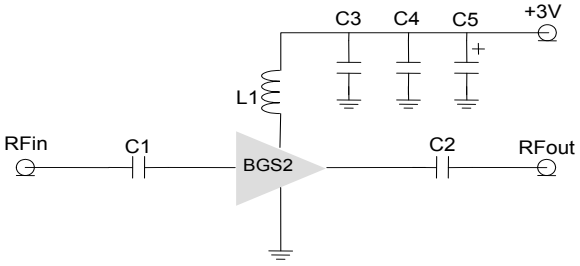
BeRex's BGS2 is a high SiGe HBT MMIC amplifier, internally matched to 50 Ohms without the need for external components. Designed to run directly from a 3V supply. The BGS2 is designed for high linearity 3V gain block applications . It is packaged in a RoHS-compliant with SOT-363 surface mount package.

Applications

- Driver Amplifier
- Cellular, PCS, GSM, UMTS, WCDMA

Applications Circuit

Application Circuit Values Example		
Freq.	70~900MHz	900MHz ~ 4GHz
C1/C2	2nF	100pF
L1(1608 Chip Ind.)	1uH	56nH



*C1, C2, C3 =100 pF ± 5%; C4 = 1000 pF ± 5%; C5 = 10uF; **L1 = 56nH

**less than 56nH improves RF performance at over 0.9GHz.

*1uH or higher value L1 improves RF performance at under 900MHz.

*Optimum value of L1 may vary with board design.

*C1,C2=2000pF, L1=1uH for 70MHz application,

Typical Performance[1]

Parameter	Frequency				Unit
	70	900	1900	2450	MHz
Gain	26.5	23.2	19.1	18.3	dB
S11	-21.0	-17.0	-17.0	-18.0	dB
S22	-16.0	-15.0	-13.0	-15.0	dB
OIP3[2]	31.0	24.8	23.4	21.6	dBm
P1dB	15.4	13.1	12.1	10.6	dBm
Noise Figure	2.7	2.3	2.2	2.3	dB

[1] Device performance _ measured on a BeRex evaluation board at 25°C, 50 Ω system.

[2] OIP3 _ measured with two tones at an output of 0 dBm per tone separated by 1 MHz.

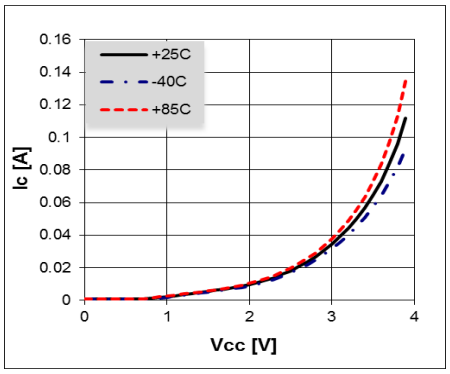
	Min.	Typical	Max.	Unit
Bandwidth	70		4000	MHz
I_C @ (Vc = 3V)	30	34	38	mA
V_C		3.0		V
dG/dT		-0.005		dB/°C
R_{TH}		130		°C/W

Absolute Maximum Ratings

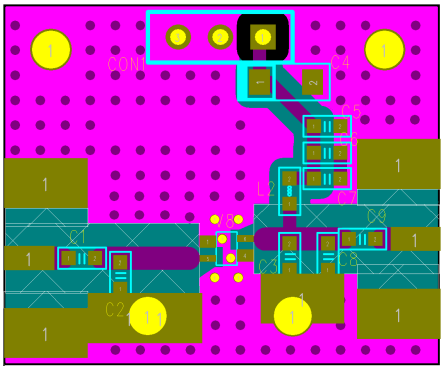
Parameter	Rating	Unit
Operating Case Temperature	-40 to +85	°C
Storage Temperature	-55 to +155	°C
Junction Temperature	+150	°C
Operating Voltage	+3.8	V
Supply Current	100	mA
Input RF Power	15	dBm

Operation of this device above any of these parameters may result in permanent damage.

V-I Characteristics



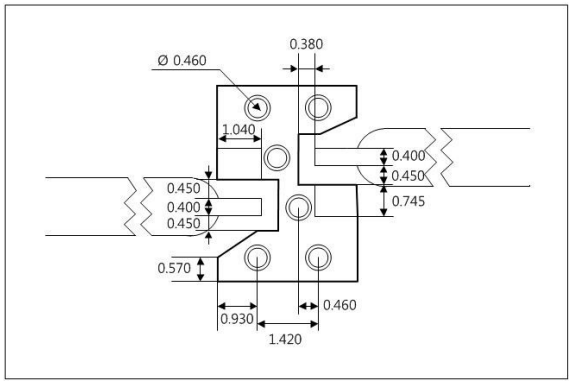
BeRex SOT-363 Evaluation



*Dielectric constant _ 4.2 *31mil thick FR4 PCB

Suggested PCB Land Pattern and PAD Layout

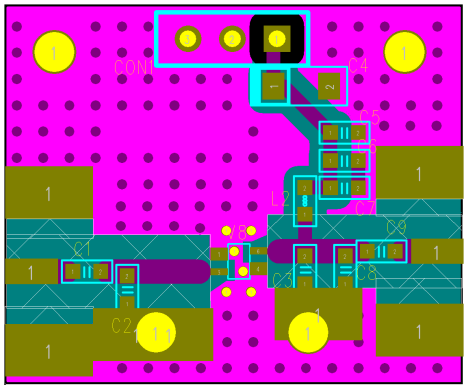
PCB Land Pattern



Note : All dimension _ millimeters

PCB lay out _ on BeRex website

PCB Mounting



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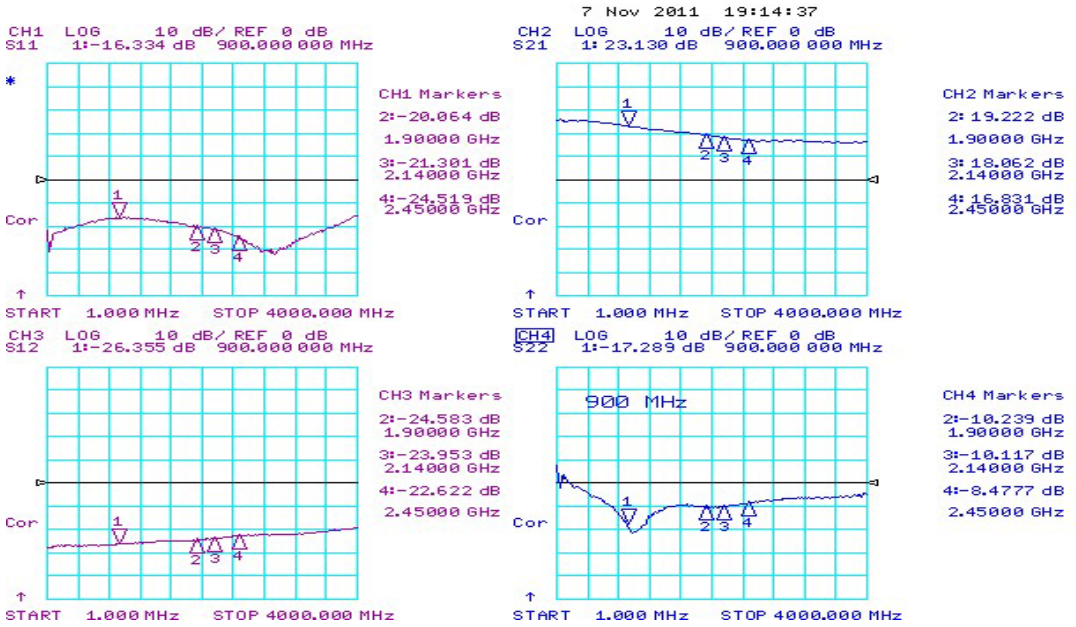
50-4000 MHz SILICON GERMANIUM Gain Block

Typical Device Data

S-parameters (Vc=3V, Ic=34mA, T=25°C)



S-Parameter

(Vdevice = 3.0V, Icc = 34mA, T = 25 °C, calibrated to device leads)

Freq [MHz]	S11 Mag	S11 Ang	S21 Mag	S21 Ang	S12 Mag	S12 Ang	S22 Mag	S22 Ang
70.00	0.06	175.7	18.6	172.2	0.04	5.0	1.45	179.5
900.00	0.15	47.7	14.3	126.6	0.04	23.5	0.13	-130.7
1000.00	0.15	40.7	13.6	122.9	0.05	24.7	0.08	-178.4
1500.00	0.13	16.7	10.9	108.0	0.05	33.8	0.29	130.5
2000.00	0.09	4.1	8.71	92.1	0.05	40.0	0.29	119.3
2500.00	0.05	-3.8	7.01	88.8	0.07	48.5	0.38	96.5
3500.00	0.03	46.3	6.95	82.6	0.07	53.2	0.46	90.7
4000.00	0.17	72.4	6.35	58.7	0.10	58.0	0.56	49.9

Typical Performance (Vd = 3.0V, Ic = 34mA, T = 25°C)

Freq	MHz	50	70	900	1900	2140	2450
S21	dB	26.8	26.5	23.2	19.1	18.3	17.3
S11	dB	-18.0	-21.6	-17.7	-17.0	-17.4	-18.0
S22	dB	-15.0	-16.5	-15.1	-12.5	-13.0	-14.4
P1	dBm	15.4	15.4	13.1	12.1	11.7	10.6
OIP3	dBm	32.0	31.0	24.8	23.4	23.1	22.5
NF	dB	2.7	2.7	2.3	2.2	2.2	2.3

Typical Performance (Vd = 3.1V, Ic = 41mA, T = 25°C)

Freq	MHz	50	70	900	1900	2140	2450
S21	dB	27.2	26.9	23.6	19.1	18.2	17.3
S11	dB	-16.3	-16.5	-16.1	-14.6	-14.9	-15.1
S22	dB	-15.0	-14.5	-15.0	-14.6	-15.6	-17.1
P1	dBm	16.3	16.5	14.1	12.6	11.5	11.7
OIP3	dBm	33.5	33.0	26.3	25.2	23.8	23.0
NF	dB	2.7	2.7	2.3	2.2	2.2	2.3

Typical Performance (Vd = 3.2V, Ic = 47mA, T = 25°C)

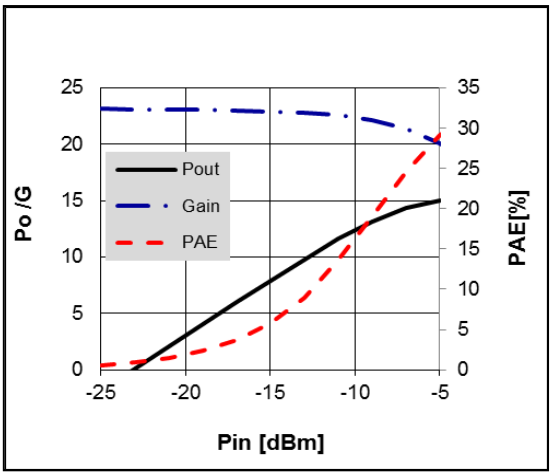
Freq	MHz	50	70	900	1900	2140	2450
S21	dB	27.4	27.1	23.4	19.2	18.4	17.4
S11	dB	-14.8	-14.9	-15.4	-14.5	-14.7	-15.0
S22	dB	-14.4	-13.5	-14.4	-15.1	-15.8	-17.6
P1	dBm	16.8	17.3	14.6	13.0	12.5	11.9
OIP3	dBm	33.5	32.5	27.0	25.2	24.2	23.4
NF	dB	2.7	2.7	2.3	2.2	2.2	2.3

Typical Performance (Vd = 3.3V, Ic = 53mA, T = 25°C)

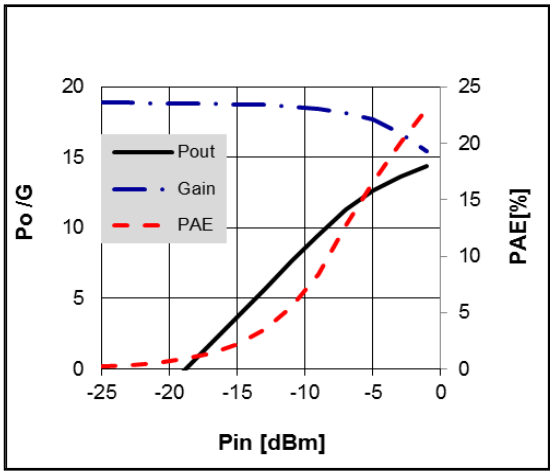
Freq	MHz	50	70	900	1900	2140	2450
S21	dB	27.8	27.4	23.5	19.2	18.4	17.4
S11	dB	-13.5	-13.6	-14.9	-14.3	-14.9	-15.0
S22	dB	-13.5	-12.6	-13.9	-15.2	-15.9	-17.9
P1	dBm	17.4	18.0	14.9	13.4	12.6	12.0
OIP3	dBm	35.0	33.5	27.3	25.0	24.2	23.5
NF	dB	2.7	2.7	2.3	2.2	2.2	2.3

Device Performance

Pin-Pout-Gain

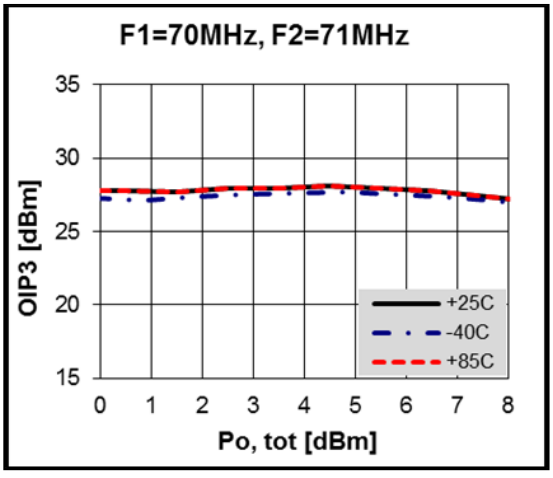


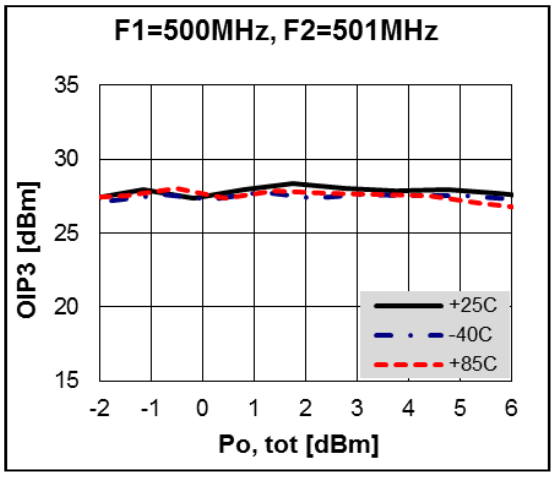
900MHz, 3V/22mA



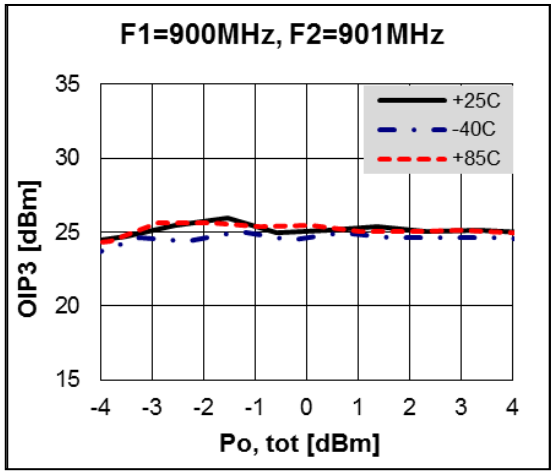
1900 MHz, 3V/22mA

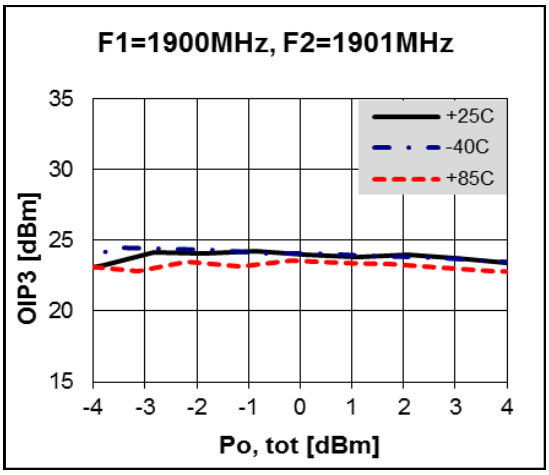
OIP3

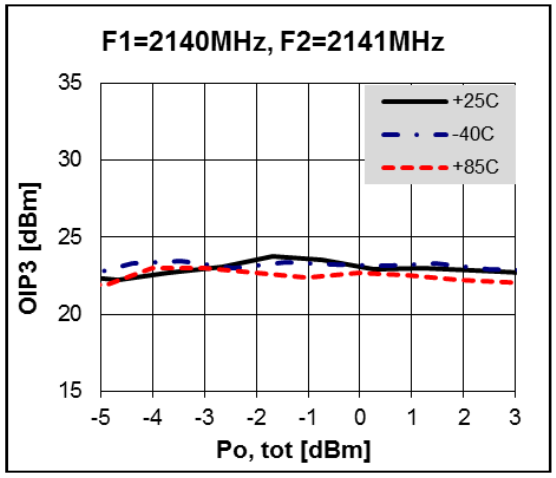


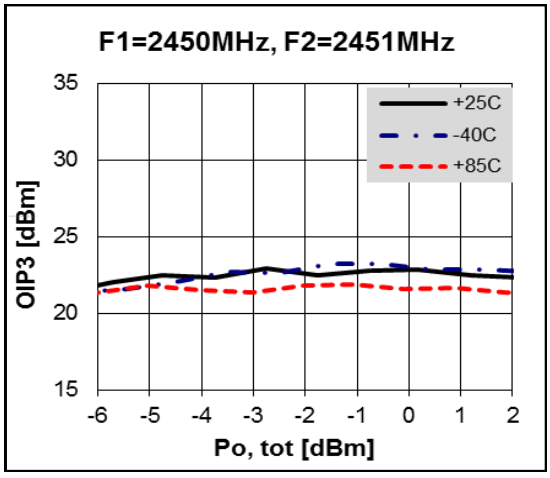


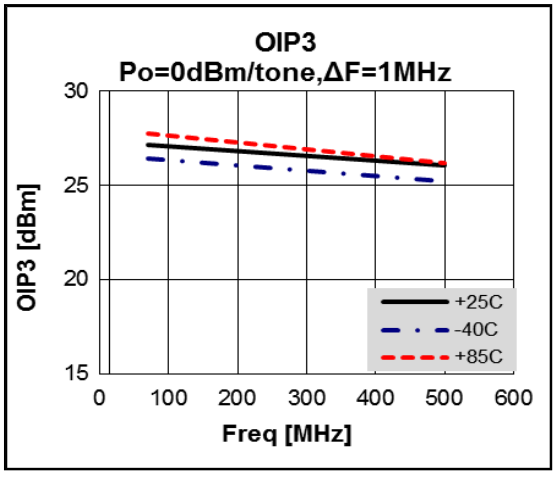
OIP3

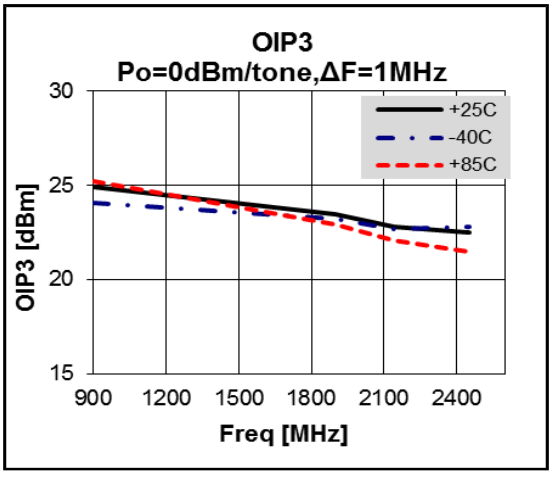




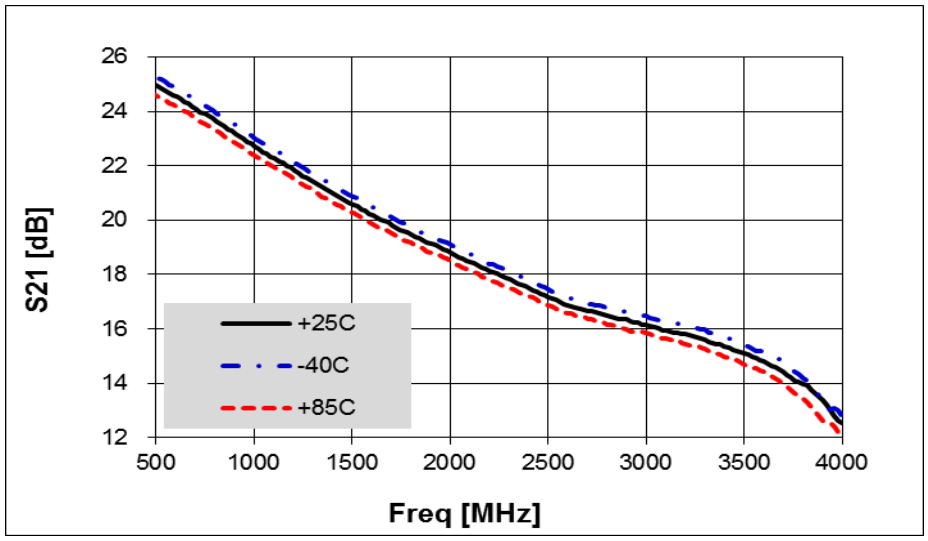




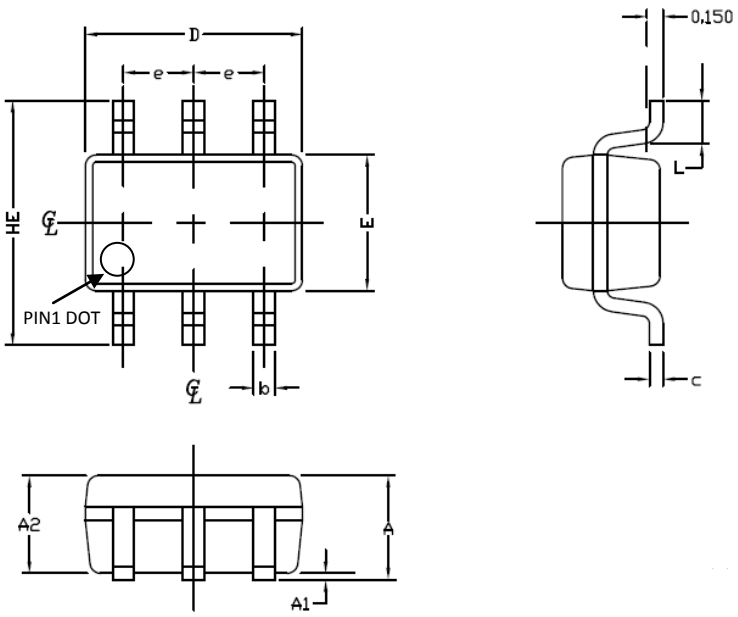




Gain Flatness



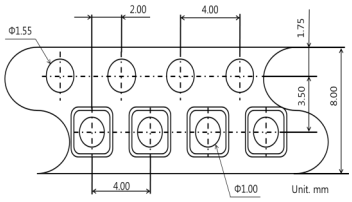
Package Outline Dimension (Unit. mm)



SYMBOL	MIN	MAX
E	1.15	1.35
D	1.85	2.25
HE	2.00	2.30
A	0.80	1.00
A2	0.80	0.91
A1	0.00	0.09
e	0.65 BSC	
b	0.15	0.30
c	0.08	0.25
L	0.21	0.41

Tape & Reel

SOT-363



Packaging information:

Tape Width (mm): 8

Reel Size (inches): 7

Device Cavity Pitch (mm): 4

Devices Per Reel: 3000

Lead plating finish

100% Tin Matte finish

(All BeRex products undergoes a 1 hour, 150 degree C, Anneal bake to eliminate thin whisker growth concerns.)

MSL / ESD Rating

ESD Rating:	Class 1C
Value:	**Passes <2000V**
Test:	Human Body Model (HBM)
Standard:	JEDEC Standard JESD22-A114B
MSL Rating:	**Level 1 at +265°C convection reflow**
Standard:	JEDEC Standard J-STD-020

NATO CAGE code:

2	**N**	**9**	**6**	**F**