

Thru and 2, 3, 4, 5 & 6-dB Attenuator Array, DIE DC - 22 GHz



ENGAT00135

Rev. V1

Features

- Ultra Wideband Performance
- Excellent Return Loss: >18 dB
- RF Power Handling: 27 dBm
- Die Size:
 - 1.39 x 2.76 x 0.1 mm
 - 0.055 x 0.109 x 0.004 inch
- RoHS* Compliant

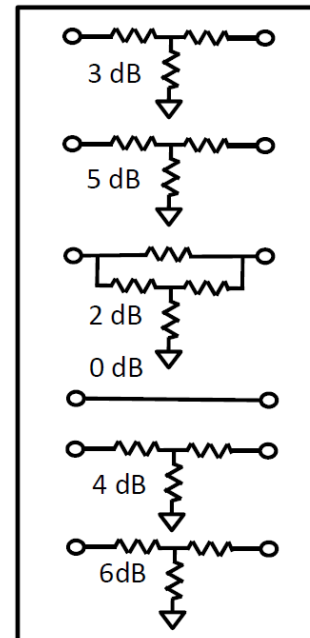
Applications

- Select at Test
- Space Hybrids
- Military Hybrids
- Microwave Radios
- Prototype Kits
- Test & Measurement Systems

Description

The ENGAT00135 is a die with 5 attenuators, plus a thru path. The part is ideal for select-at-test applications. The signal path is selected by wire bond connections to the bond pads associated for attenuation of 2, 3, 4, 5 or 6 dB, while maintaining good impedance match to 50 Ohms. The die has a gold backside metallization and is designed to be silver epoxy attached. The RF interconnects are designed to account for wire bonds and external microstrip flares for optimal integrated return loss. Nichrome resistors with low temperature coefficients are set up to handle up to 0.5 Watt RF input power levels.

Functional Block Diagram



Ordering Information

Part Number	Package
ENGAT00135	Die

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Electrical Specifications: $T_A = +25^\circ\text{C}$

Parameter	Path	Frequency (GHz)	Units	Min.	Typ.	Max.
Insertion Loss	Thru	2 22	dB	—	0.1 0.3	—
	2 dB	2 22		—	2.1 2.4	—
	3 dB	2 22		—	3.1 3.5	—
	4 dB	2 22		—	4.1 4.5	—
	5 dB	2 22		—	5.1 5.4	—
	6 dB	2 22		—	6.1 6.3	—
Input / Output Return Loss	3 dB All Others	DC - 22	dB	—	>18 >20	—
Power Handling	All	DC - 22	dBm	—	27	—

Absolute Maximum Ratings^{1,2:}

Parameter	Absolute Maximum
RF Power (assuming no DC power applied)	29 dBm
DC Voltage, applied to one port (assuming no DC power applied)	6.3 V
Operating Temperature	-55°C to +125°C
Storage Temperature	-65°C to +150°C

1. Exceeding any one or combination of these limits may cause permanent damage to this device.
2. MACOM does not recommend sustained operation near these survivability limits.

Handling Procedures

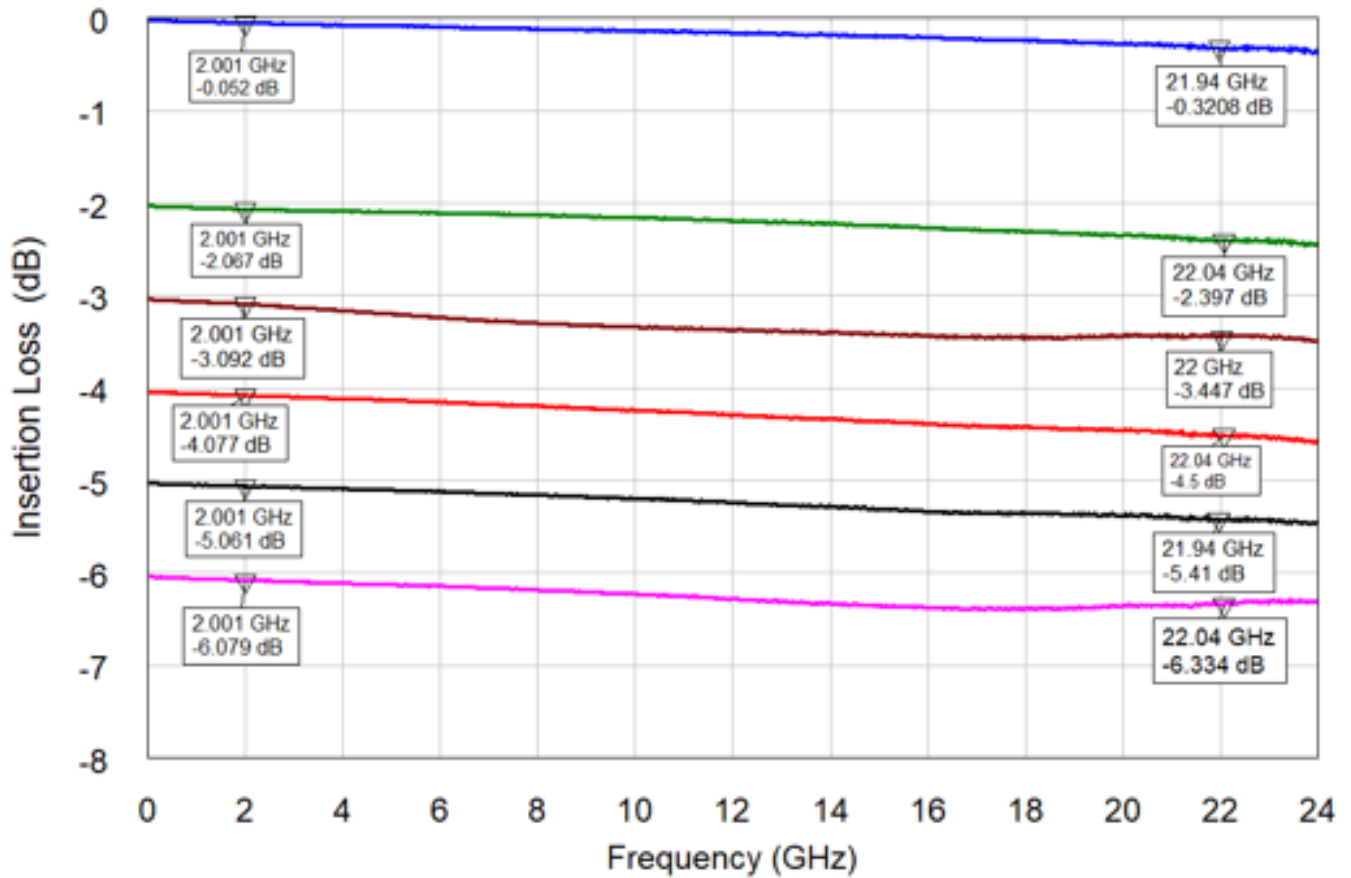
Please observe the following precautions to avoid damage:

Static Sensitivity

These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

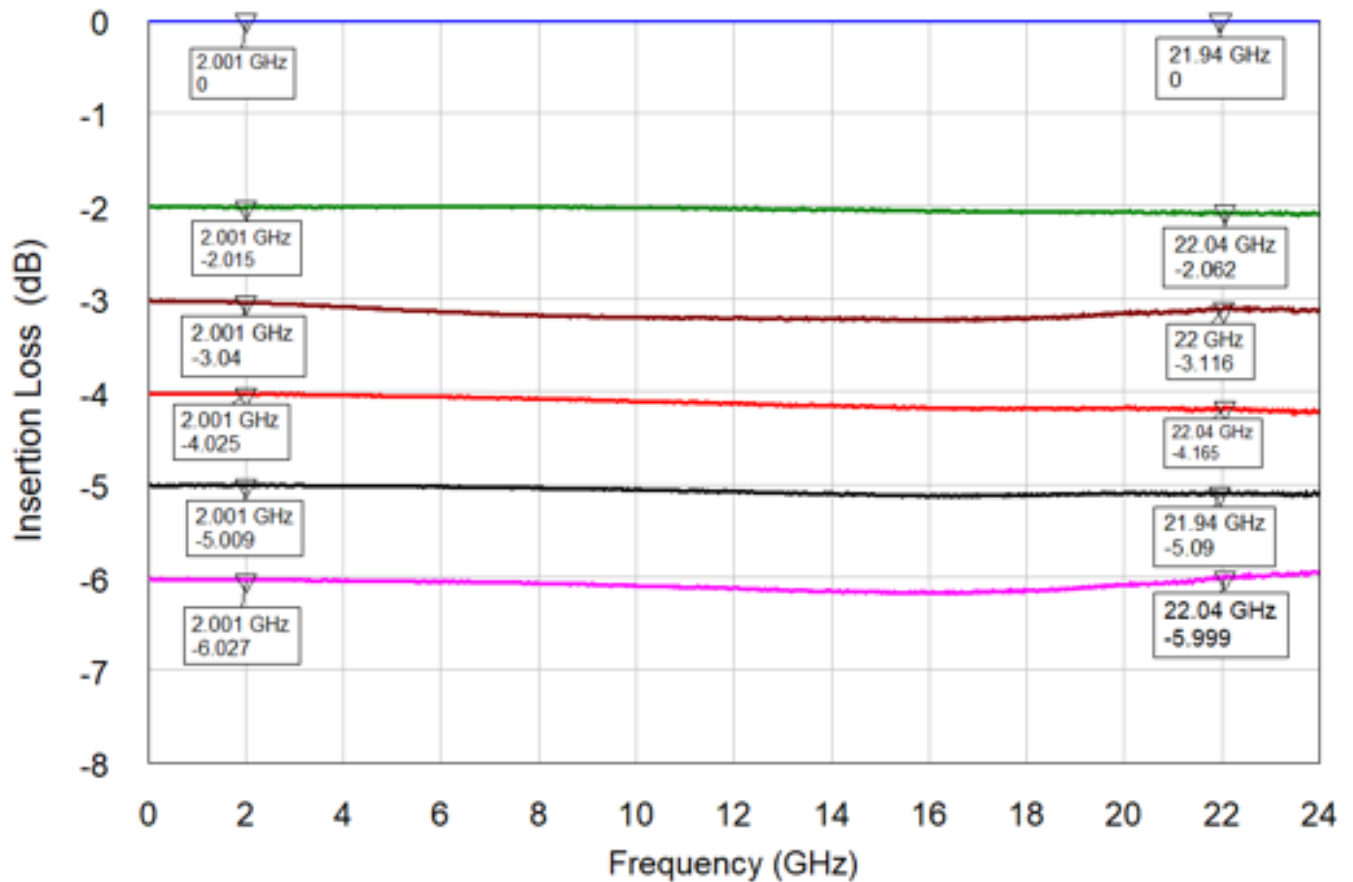
RF Data With Wirebonds and External Flare Pads

Insertion Loss



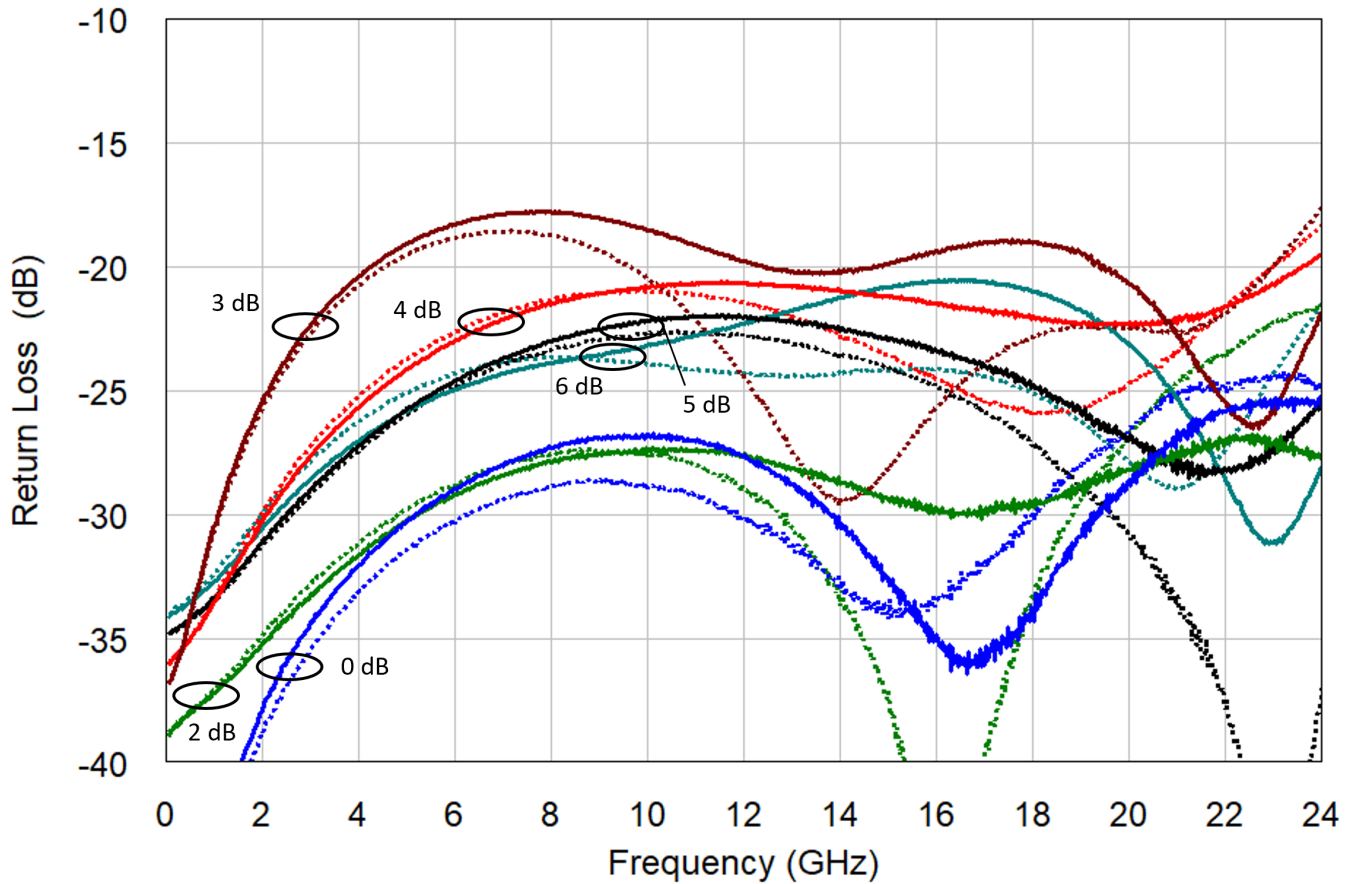
RF Data With Wirebonds and External Flare Pads

Insertion Loss



RF Data With Wirebonds and External Flare Pads

Measured Return Loss: Input RL Solid, Output RL Dotted

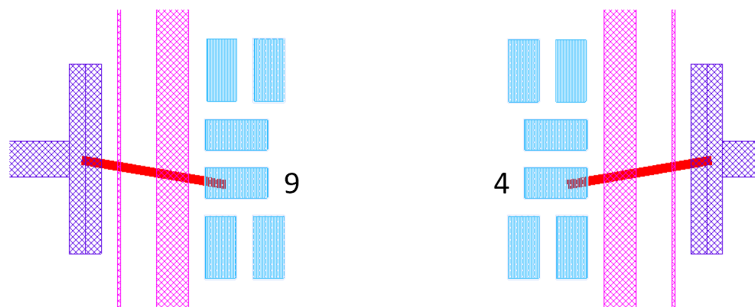


Wire Bond Configurations and Suggested Microstrip Flares

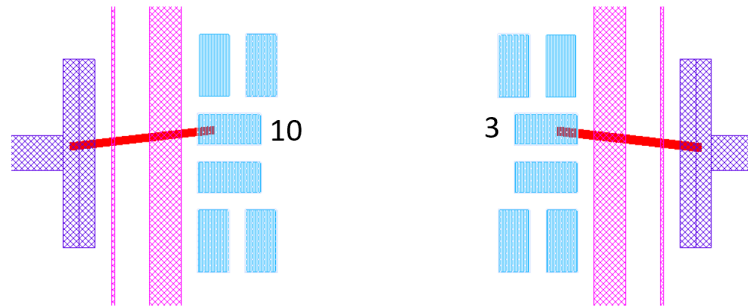
1 mil dia. Gold wire

X-dimension wire length 380um (15 mils)

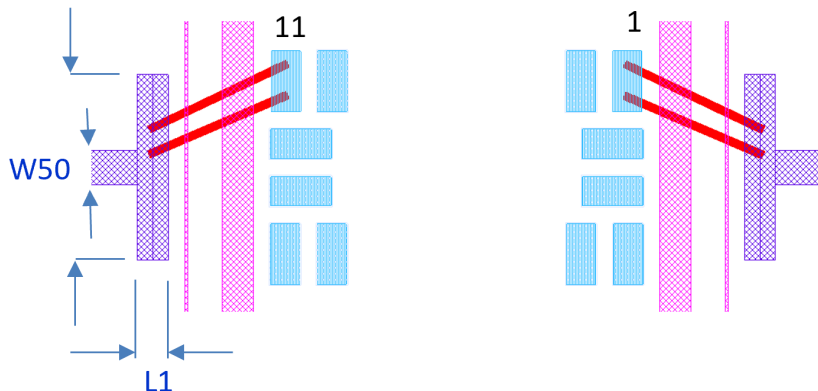
Wire Bond
(2 places) as
shown for Thru Line



Wire Bond
(2 places) as
shown for 2 dB



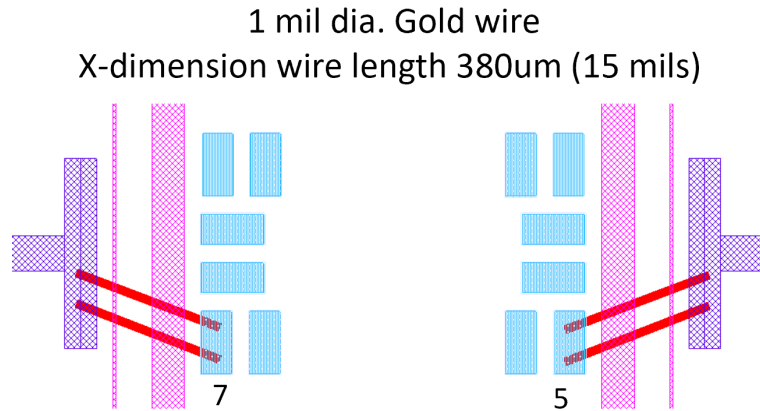
Wire Bond
(4 places) as
shown for 3 dB



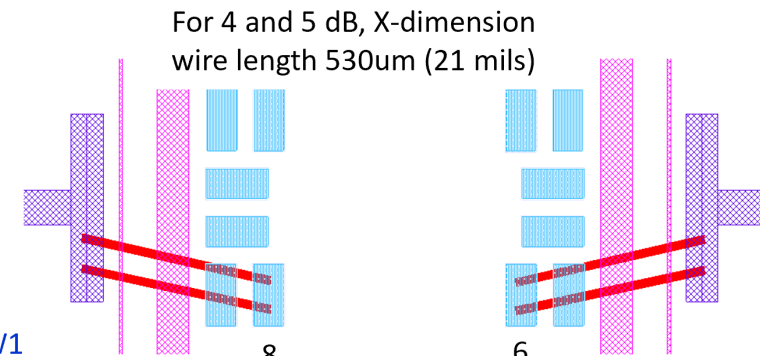
Application Substrate	W50 (for 50 Ω) (μm)	W1 flare width (μm)	L1 flare length (μm)
5 mil Alumina	120	590	100
10 mil Alumina	240	590	160
8 mil Rogers 4003	438	452	185

Wire Bond Configurations and Suggested Microstrip Flares

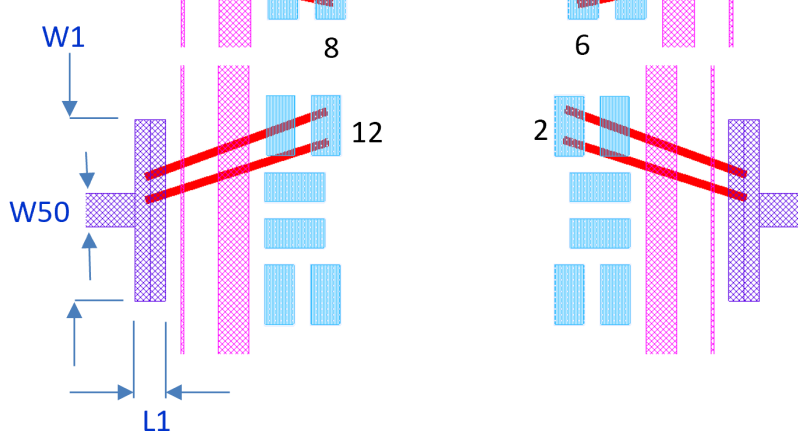
Wire Bond
(4 places) as
shown for 6 dB



Wire Bond
(4 places) as
shown for 4 dB



Wire Bond
(4 places) as
shown for 5 dB



Application Substrate	W50 (for 50 Ω) (μm)	W1 flare width (μm)	L1 flare length (μm)
5 mil Alumina	120	590	100
10 mil Alumina	240	590	160
8 mil Rogers 4003	438	452	185

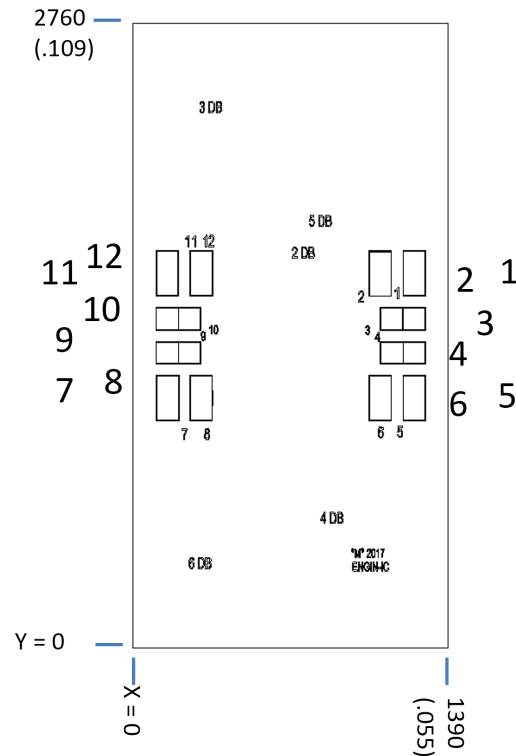
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Outline Drawing



Pad Dimensions

Bondpad Label	Signal	RF Bond Pad Dimensions		RF Bond Pad Center	
		Length (x-dim, μm)	Width (y-dim, μm)	Length (x-dim, μm)	Width (y-dim, μm)
1	3 dB Output	100	200	1241	1655
2	5 dB Output	100	200	1091	1655
3	2 dB Output	200	100	1191	1455
4	Thru Output	200	100	1191	1305
5	6 dB Output	100	200	1241	1105
6	4 dB Output	100	200	1091	1105
7	6 dB Input	100	200	150	1105
8	4 dB Input	100	200	300	1105
9	Thru dB Input	200	100	200	1305
10	2 dB Input	200	100	200	1455
11	3 dB Input	100	200	150	1655
12	5 dB Input	100	200	300	1655

All dimensions are given in both μm (inches).

Substrate thickness: 100 μm (0.004").

Backside metallization is gold.

Bond pad metallization is gold.

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