DATA SHEET

AT001D6-25, AT001D6-25LF: GaAs IC 4-Bit Digital Attenuator 3 dB LSB 300 kHz–1 GHz

Features

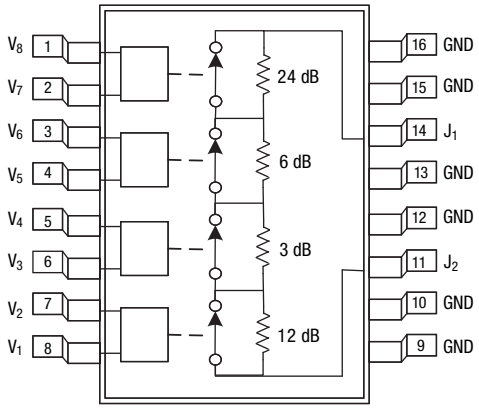
- Attenuation in 3 dB steps to 45 dB
- Low DC power consumption
- Low-cost SOIC-16 plastic package
- Available lead (Pb)-free and RoHS-compliant MSL-1 @ 260 °C per JEDEC J-STD-020

Description

The AT001D6-25 is an IC FET digital attenuator consisting of four monolithic attenuators with LSB of 3 dB and a total attenuation of 45 dB with all attenuators connected. The attenuator is packaged in the plastic 16-lead surface mount package for low-cost commercial cellular radio applications.

NEW Skyworks offers lead (Pb)-free, RoHS (Restriction of Hazardous Substances)-compliant packaging.

Pin Out



Electrical Specifications at 25 °C (0, -5 V)

Parameter(1)	Frequency	Min.	Typ.	Max.	Unit
Insertion loss(2)	300 kHz–0.5 GHz 300 kHz–1.0 GHz		2.5 3.5	3.2 4.0	dB dB
Attenuation accuracy(3)	300 kHz–1.0 GHz	10% or ± 0.5 dB Whichever is greater 12% for 45 dB attenuation			
Attenuation range	300 kHz–1.0 GHz		45		dB
VSWR (I/O)	300 kHz–0.5 GHz 300 kHz–1.0 GHz		1.4:1 1.6:1	1.6:1 1.8:1	

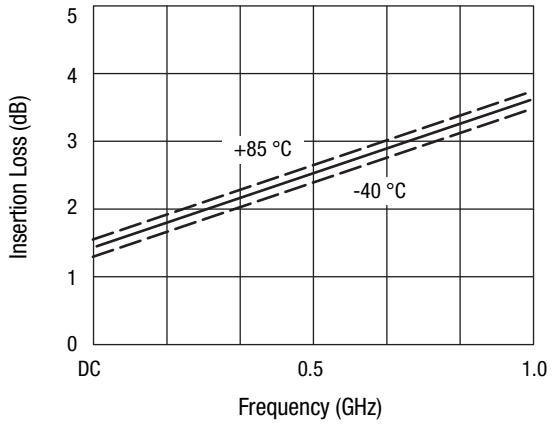
Operating Characteristics at 25 °C (0, -5 V)

Parameter	Condition	Frequency	Min.	Typ.	Max.	Unit
Switching characteristics						
Rise, fall	10/90% or 90/10% RF			10		ns
On, off	50% CTL to 90/10% RF			20		ns
Video feedthru	T_{RISE} = 1 ns, BW = 500 MHz			20		mV
Input power for 1 dB compression		0.5–1 GHz 0.05 GHz		24 14		dBm dBm
Intermodulation intercept point (IP3)	For two-tone input power 13 dBm	0.5–1 GHz 0.05 GHz		43 32		dBm dBm
Thermal resistance				25		°C/W
Control voltages	V_{LOW} = 0 to -0.2 V @ 20 µA max. V_{HIGH} = -5 V @ 50 µA to -8 V at 200 µA max.					

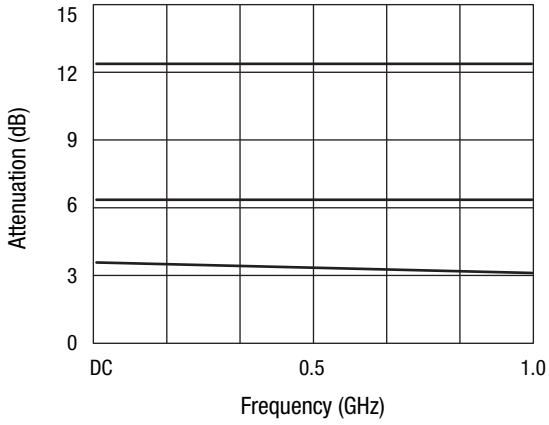
1. All measurements made in a 50 Ω system, unless otherwise specified.
2. Insertion loss changes by 0.003 dB/°C.
3. Attenuation referenced to insertion loss.

Typical Performance Data (0, -5 V)

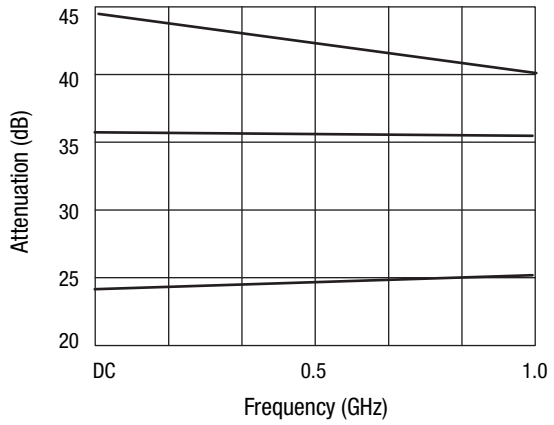
T = 25 °C, Z_0 = 50 Ω unless otherwise noted



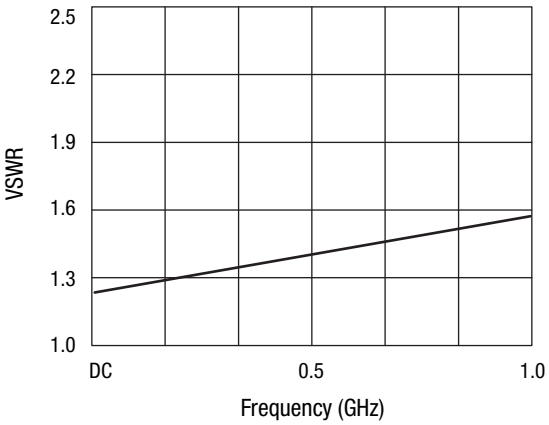
Insertion Loss vs. Frequency



3, 6, 12 dB States



24, 36, 45 dB States



VSWR vs. Frequency (All States)

Absolute Maximum Ratings

Characteristic	Value
RF input power	2 W > 500 MHz 0/-8 V 0.5 W @ 50 MHz 0/-8 V
Control voltage	+0.2 V, -8 V
Operating temperature	-40 °C to +85 °C
Storage temperature	-65 °C to +150 °C

Performance is guaranteed only under the conditions listed in the specifications table and is not guaranteed under the full range(s) described by the Absolute Maximum specifications. Exceeding any of the absolute maximum/minimum specifications may result in permanent damage to the device and will void the warranty.

CAUTION: *Although this device is designed to be as robust as possible, ESD (Electrostatic Discharge) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions must be employed at all times.*

Recommended Solder Reflow Profiles

Refer to the *"Recommended Solder Reflow Profile"* Application Note.

Tape and Reel Information

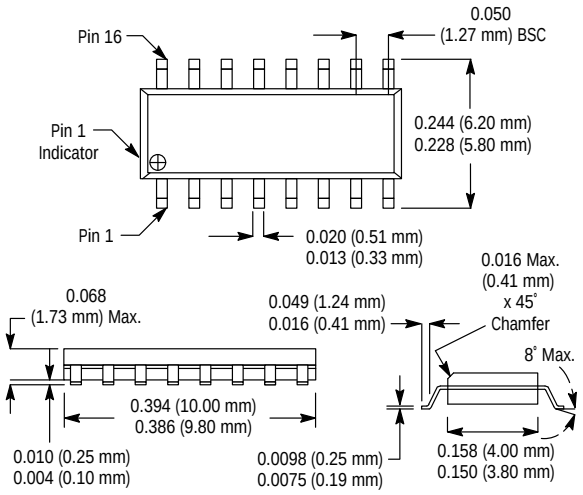
Refer to the *"Discrete Devices and IC Switch/Attenuators Tape and Reel Package Orientation"* Application Note.

Truth Table

V_1	V_2	V_3	V_4	V_5	V_6	V_7	V_8	Attenuation
12 dB		3 dB		6 dB		24 dB		J_1–J_2
-5	0	-5	0	0	-5	0	-5	Reference I.L.
-5	0	0	-5	0	-5	0	-5	3 dB
-5	0	-5	0	-5	0	0	-5	6 dB
0	-5	-5	0	0	-5	0	-5	12 dB
-5	0	-5	0	0	-5	-5	0	24 dB
0	-5	0	-5	-5	0	-5	0	45 dB

All other conditions not recommended.
$V_1 = NOT(V_2)$.
$V_3 = NOT(V_4)$.
$V_5 = NOT(V_6)$.
$V_7 = NOT(V_8)$.

SOIC-16



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