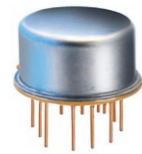


Precision

Digital Step Attenuator

TOAT-R512+

50Ω TTL Control, Pin Diode 10 to 1000 MHz



CASE STYLE: QQ96
PRICE: \$64.45 ea. QTY (1-9)

+ RoHS compliant in accordance with EU Directive (2002/95/EC)

The +Suffix has been added in order to identify RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications.

Maximum Ratings

Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 125°C
Input Power	15 dBm
DC Voltage	5.5 V
TTL	5.5V

Permanent damage may occur if any of these limits are exceeded.

Pin Connections

RF IN	4
RF OUT	11
TTL CONTROL #1	2
TTL CONTROL #2	3
TTL CONTROL #3	1
+5V DC	12
CASE GROUND	5,6,7,8,9,10

Features

- wideband, 10 to 1000 MHz
- excellent step accuracy, 0.2 dB typ.
- excellent VSWR 1.3 typ.
- low DC current, 6 mA typ.
- hermetic, metal, TO-8 case

Applications

- base stations
- cellular
- test-sets
- military, hi-rel applications

Digital Step Attenuator Electrical Specifications

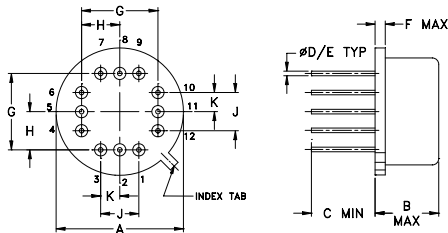
MODEL NO.	FREQUENCY (MHz)		PRIMARY ATTENUATION STEPS (dB)			ATTENUATION (dB)		VSWR (:1)		
	f_1	f_2	#1	#2	#3	(1,1,1)** Nom.	(0,0,0) Max.	L	M	U
TOAT-R512+	10	1000	0.5±0.18	1±0.25	2±0.25	3.5	4.0	1.6	1.4	1.5

L=10 to 100 MHz M=100 to 500 MHz U=500 to 1000 MHz

** Total attenuation above thru-loss.

1. Step accuracy is specified for basic steps. For combination of steps accuracy is additive.
2. Thru-loss is minimum insertion loss with all attenuation elements bypassed (All TTL controls state are Low)
3. For optimum operation of TOAT models, ensure the device case is properly connected to the ground plane (of PC board)

Outline Drawing



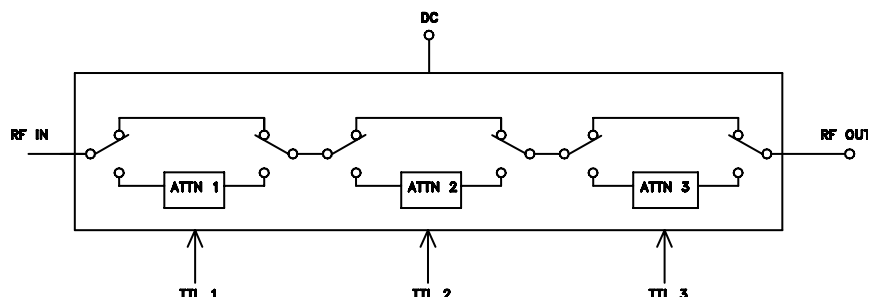
Outline Dimensions (inch/mm)

A	B	C	D	E	F
.600	.250	.25	.016	.020	.04
15.24	6.35	6.35	0.41	0.51	1.02
G	H	J	K		wt
.400	.200	.200	.100		grams
10.16	5.08	5.08	2.54		4.0

Additional Specifications

DC Voltage	+5V
DC Current	12mA max.
Switching Time (50% TTL to within specified accuracy of the next-selected attenuation step, and to within 0.1 dB of steady-state Thru-Loss)	10µs typ., 15µs max.,
TTL Input High Threshold	2V min
TTL Input Low Threshold	0.8V max.
TTL Toggle Rate	50 kHz typ.
1dB Compression	0 dBm (10-100 MHz) +10 dBm (100-1000MHz)

Electrical Schematic



Mini-Circuits®
ISO 9001 ISO 14001 AS 9100 CERTIFIED

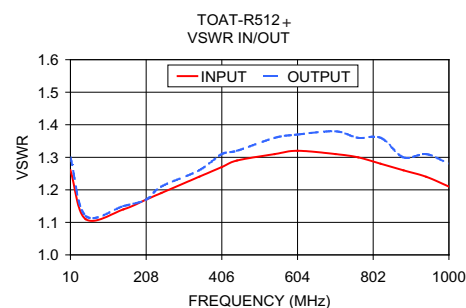
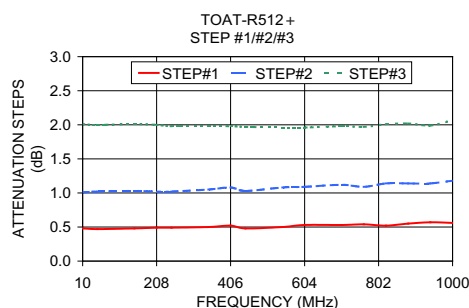
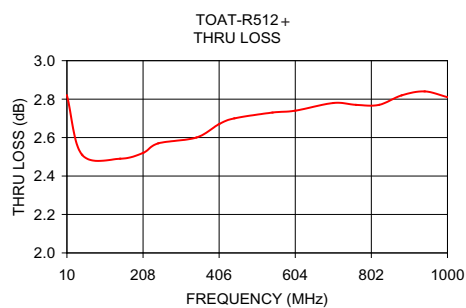
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Step Attenuation* at TTL Control State

FREQ.	000	001	010	011	100	101	110	111
(MHz)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
10.00	2.82	0.48	1.01	1.49	2.01	2.49	3.01	3.51
49.60	2.51	0.47	1.02	1.51	2.00	2.49	3.06	3.53
148.60	2.49	0.48	1.03	1.49	2.01	2.51	3.05	3.50
208.00	2.52	0.49	1.02	1.51	2.00	2.50	3.03	3.48
247.60	2.57	0.49	1.02	1.51	1.98	2.48	3.02	3.50
346.60	2.60	0.50	1.05	1.54	1.98	2.49	3.02	3.51
406.00	2.67	0.52	1.08	1.57	1.98	2.47	3.04	3.53
445.60	2.70	0.48	1.03	1.55	1.97	2.48	3.02	3.51
544.60	2.73	0.50	1.08	1.57	1.96	2.49	3.04	3.54
604.00	2.74	0.53	1.09	1.60	1.96	2.52	3.07	3.57
703.00	2.78	0.53	1.12	1.66	1.98	2.54	3.08	3.61
762.40	2.77	0.54	1.09	1.62	1.97	2.50	3.06	3.57
821.80	2.77	0.52	1.14	1.68	2.01	2.55	3.10	3.66
881.20	2.82	0.55	1.14	1.70	2.02	2.57	3.12	3.70
940.60	2.84	0.57	1.14	1.70	1.99	2.59	3.14	3.73
1000.00	2.81	0.56	1.18	1.71	2.07	2.62	3.18	3.76

INPUT VSWR

FREQ.	001	010	011	100	101	110	111
(MHz)							
10.00	1.26	1.26	1.24	1.27	1.25	1.25	1.23
49.60	1.11	1.10	1.10	1.10	1.10	1.10	1.09
148.60	1.14	1.14	1.14	1.13	1.13	1.13	1.13
208.00	1.17	1.17	1.17	1.15	1.16	1.16	1.16
247.60	1.19	1.20	1.20	1.17	1.18	1.18	1.19
346.60	1.24	1.25	1.25	1.22	1.23	1.23	1.24
406.00	1.27	1.28	1.28	1.24	1.25	1.27	1.27
445.60	1.29	1.30	1.30	1.26	1.27	1.29	1.29
544.60	1.31	1.33	1.33	1.29	1.30	1.32	1.33
604.00	1.32	1.34	1.34	1.30	1.31	1.34	1.34
703.00	1.31	1.34	1.33	1.30	1.31	1.35	1.35
762.40	1.30	1.33	1.33	1.30	1.31	1.34	1.35
821.80	1.28	1.32	1.31	1.29	1.30	1.34	1.34
881.20	1.26	1.30	1.30	1.28	1.28	1.33	1.32
940.60	1.24	1.28	1.27	1.26	1.26	1.31	1.31
1000.00	1.21	1.25	1.25	1.23	1.25	1.29	1.29

OUTPUT VSWR

FREQ.	001	010	011	100	101	110	111
(MHz)							
10.00	1.30	1.27	1.27	1.22	1.21	1.20	1.20
49.60	1.12	1.12	1.12	1.09	1.09	1.09	1.09
148.60	1.15	1.15	1.16	1.12	1.11	1.11	1.11
208.00	1.17	1.18	1.18	1.12	1.13	1.12	1.14
247.60	1.21	1.21	1.21	1.14	1.15	1.15	1.15
346.60	1.26	1.27	1.29	1.18	1.19	1.20	1.20
406.00	1.31	1.33	1.33	1.22	1.23	1.24	1.23
445.60	1.32	1.32	1.34	1.22	1.23	1.25	1.26
544.60	1.36	1.37	1.38	1.25	1.25	1.28	1.28
604.00	1.37	1.39	1.39	1.26	1.26	1.31	1.28
703.00	1.38	1.41	1.41	1.26	1.26	1.29	1.29
762.40	1.36	1.39	1.39	1.28	1.27	1.29	1.29
821.80	1.36	1.39	1.39	1.28	1.26	1.30	1.28
881.20	1.30	1.37	1.37	1.25	1.23	1.27	1.26
940.60	1.31	1.37	1.35	1.23	1.23	1.26	1.26
1000.00	1.28	1.33	1.32	1.22	1.22	1.24	1.26

* Step attenuation above thru-loss (TTL logic 000)



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