

# Plug-In Switch

50Ω SPDT Pin Diode, Reflective TTL Driver, 10 to 3000 MHz

## TOSW-230+



Generic photo used for illustration purposes only

CASE STYLE: QQ96

**+RoHS Compliant**

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

### Maximum Ratings

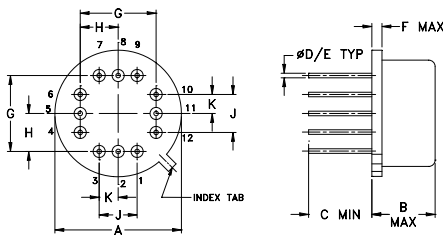
Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
Power	L(+20 dBm), M(+28 dBm), U(+30 dBm)
Supply V	+6V max.

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

### Pin Connections

RF IN (COM)	8
RF OUT 1	5
RF OUT 2	11
TTL IN	3
+5V	1
GROUND	2,4,6,7,9,10,12
CASE GROUND	2,4,6,7,9,10,12

### 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

### Features

- wideband, 10 to 3000 MHz
- hermetic, compact TO-8 can
- high isolation, 40 dB typ.

### Applications

- military, hi-rel applications
- antenna switching
- satellite communication

### Switch Electrical Specifications

MODEL NO.	FREQ. (MHz)		INSERTION LOSS (dB)				IN-OUT ISOLATION (dB)							
	$f_L$	$f_U$	Low band lw		Upper band U		Frequency Band L			Frequency Band M			Frequency Band U	
			Typ.	Max.	Typ.	Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.
TOSW-230+	10	3000	1.3	1.9	1.8	2.7	60	40	40	28	35	22		

L= low range( $f_L$  to  $10 f_L$ )

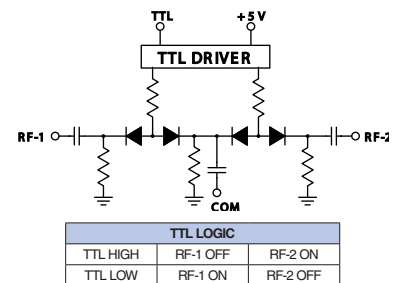
M=mid range( $10 f_L$  to  $f_U/2$ )  
lw=low band ( $f_L$  to  $f_U/2$ )

U=upper range ( $f_U/2$  to  $f_U$ )

### Additional Specifications

VSWR ("ON" STATE)	1.3 Typ., 1.9 Max.
SWITCHING TIME ( $\mu$ SEC)	2.0 Typ., 4.0 Max.
SUPPLY VOLTAGE	+5V
SUPPLY CURRENT	10 mA Max.
TTL INPUT HIGH THRESHOLD	2V Min.
TTL INPUT LOW THRESHOLD	0.8V Max.
1 dB COMPRESSION	10 to 100 MHz Above 100 MHz
	+6 increasing to +19 dBm +19 dBm min

### Control Logic



### Notes

- Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
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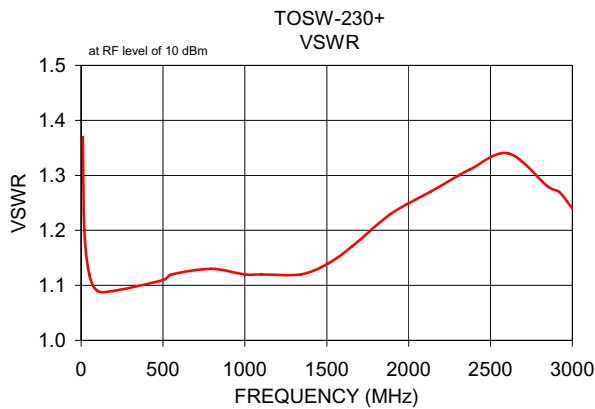
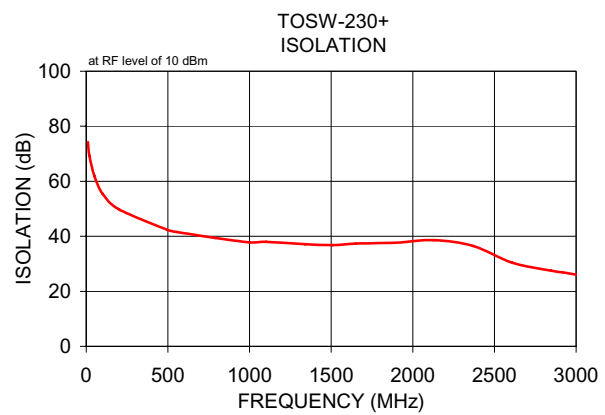
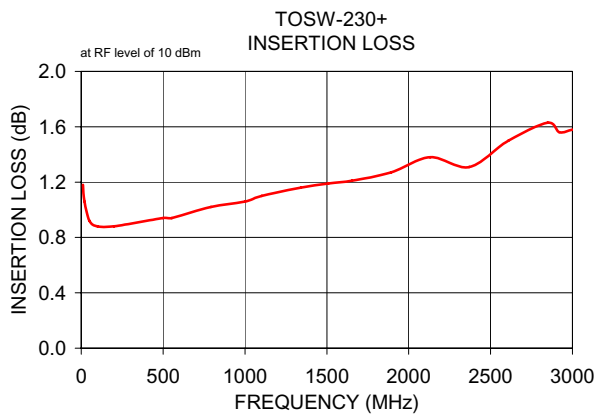


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REV. B  
M151107  
TOSW-230+  
WP/CP/AM  
200814  
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## Typical Performance Data

FREQ. (MHz)	ON INSERTION LOSS (dB) IN-OUT		AMP. UNBALANCE (dB)		OFF ISOLATION (dB) IN-OUT		OFF ISOLA- TION DELTA (dB)		IN	VSWR OUT	OUT (RF1) OFF
	$\bar{X}$	$\sigma$	$\bar{X}$	$\sigma$	$\bar{X}$	$\sigma$	$\bar{X}$	$\sigma$			
10.00	1.18	0.04	0.03	0.02	74.26	1.60	1.14	0.39	1.37	1.41	31.26
20.00	1.06	0.05	0.05	0.05	69.20	1.46	1.45	1.51	1.20	1.22	30.31
50.00	0.92	0.03	0.02	0.01	61.84	1.14	1.60	1.01	1.12	1.12	30.07
100.00	0.88	0.03	0.02	0.01	55.48	0.61	0.75	0.63	1.09	1.10	30.07
200.00	0.88	0.02	0.02	0.01	49.81	0.72	0.64	0.70	1.09	1.09	30.49
500.00	0.94	0.02	0.02	0.01	42.32	0.56	0.53	0.77	1.11	1.11	29.97
552.91	0.94	0.02	0.01	0.01	41.56	0.50	0.61	0.74	1.12	1.10	28.88
792.00	1.02	0.01	0.01	0.01	39.41	0.46	0.68	0.76	1.13	1.12	26.27
1000.00	1.06	0.01	0.01	0.01	37.86	0.40	0.67	0.71	1.12	1.10	24.84
1102.82	1.10	0.01	0.01	0.01	37.96	0.40	0.70	0.73	1.12	1.08	22.83
1341.91	1.16	0.01	0.02	0.01	37.13	0.42	0.94	0.69	1.12	1.06	21.66
1509.27	1.19	0.02	0.02	0.01	36.81	0.45	0.96	0.75	1.14	1.07	20.69
1652.73	1.21	0.01	0.02	0.01	37.32	0.53	0.89	0.79	1.17	1.09	19.92
1891.82	1.27	0.02	0.02	0.02	37.64	0.67	1.82	0.71	1.23	1.14	19.28
2130.91	1.38	0.02	0.02	0.03	38.60	1.13	0.82	0.94	1.27	1.20	24.87
2370.00	1.31	0.02	0.03	0.03	36.48	3.02	2.00	1.04	1.31	1.31	19.46
2609.09	1.50	0.04	0.06	0.03	30.37	2.46	0.49	0.56	1.34	1.37	11.80
2848.18	1.63	0.06	0.04	0.02	27.51	2.19	0.30	0.21	1.28	1.41	10.49
2919.91	1.56	0.04	0.03	0.02	26.87	2.12	0.56	0.28	1.27	1.41	9.46
3000.00	1.58	0.04	0.05	0.03	26.08	2.02	0.86	0.48	1.24	1.35	11.35



### Notes

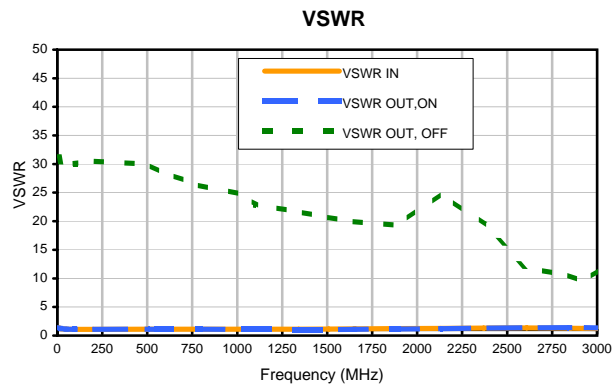
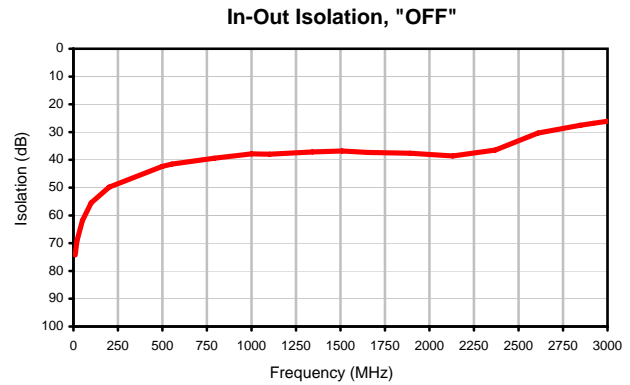
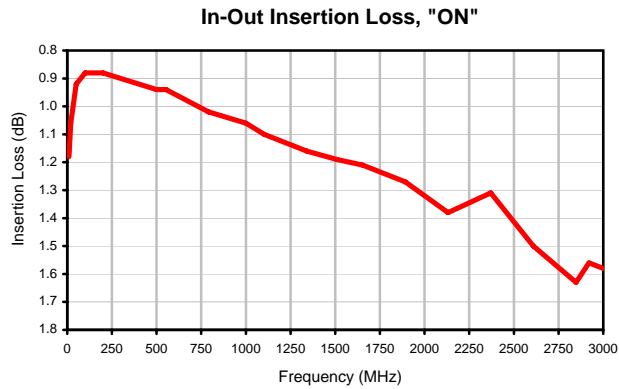
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## Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS (dB) IN-OUT , "ON"	ISOLATION (dB) IN-OUT , "OFF"	VSWR (:1)		
			IN	OUT , "ON"	OUT , "OFF"
10	1.18	74.26	1.37	1.41	31.26
20	1.06	69.20	1.20	1.22	30.31
50	0.92	61.84	1.12	1.12	30.07
100	0.88	55.48	1.09	1.10	30.07
200	0.88	49.81	1.09	1.09	30.49
500	0.94	42.32	1.11	1.11	29.97
553	0.94	41.56	1.12	1.10	28.88
792	1.02	39.41	1.13	1.12	26.27
1000	1.06	37.86	1.12	1.10	24.84
1103	1.10	37.96	1.12	1.08	22.83
1342	1.16	37.13	1.12	1.06	21.66
1509	1.19	36.81	1.14	1.07	20.69
1653	1.21	37.32	1.17	1.09	19.92
1892	1.27	37.64	1.23	1.14	19.28
2131	1.38	38.60	1.27	1.20	24.87
2370	1.31	36.48	1.31	1.31	19.46
2609	1.50	30.37	1.34	1.37	11.80
2848	1.63	27.51	1.28	1.41	10.49
2920	1.56	26.87	1.27	1.41	9.46
3000	1.58	26.08	1.24	1.35	11.35

## Typical Performance Curves

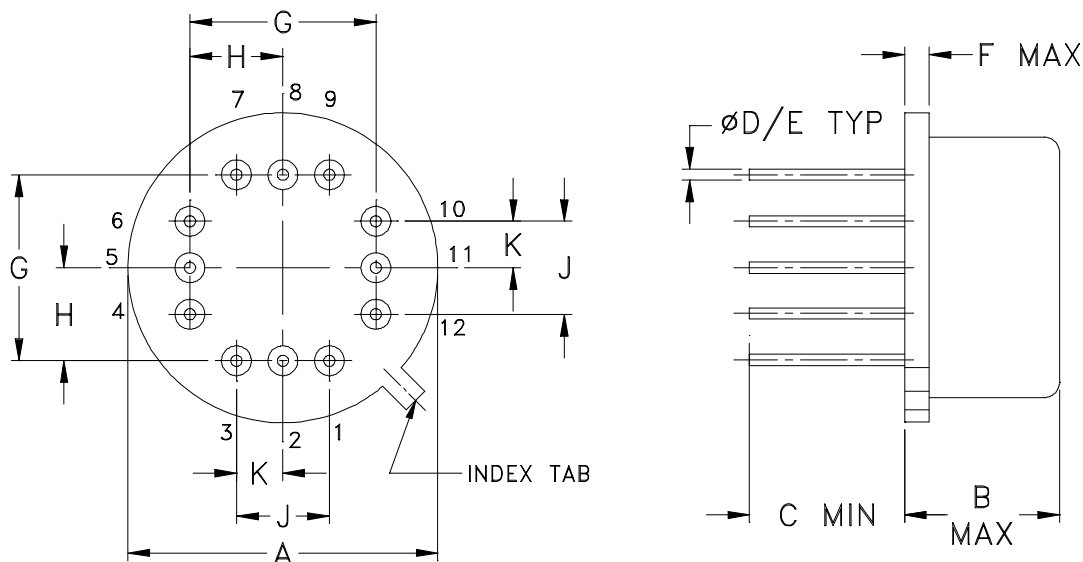


# Case Style

# QQ

QQ95  
QQ96

## Outline Dimensions



CASE#	A	B	C	D	E	F	G	H	J	K	WT. GRAM
QQ95	.500 (12.70)	.250 (6.35)	.25 (6.35)	.016 (.41)	.020 (.51)	.04 (1.02)	.300 (7.62)	.150 (3.81)	.150 (3.81)	.075 (1.91)	3.5
QQ96	.600 (15.24)	.250 (6.35)	.25 (6.35)	.016 (.41)	.020 (.51)	.04 (1.02)	.400 (10.16)	.200 (5.08)	.200 (5.08)	.100 (2.54)	4.0

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm .03$ ; 3 Pl.  $\pm .015$

### Notes:

- Header material: Kovar.  
Pin material: Kovar.  
Cover material: Nickel.
- Pin finish: Gold plate 25  $\mu$  inches (.64 microns) min.
- For pin designations see specification data sheet.
- Pin numbers do not appear on unit, for reference only.

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All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Thermal Shock	-55° to 100°C, 10 cycles	MIL-STD-202, Method 107, Condition A, except +100°C & 10 cycles
Constant Acceleration	5000g, Y1 axis	MIL-STD-883, Method 2001, Condition A, except Y1 axis only
Solderability	10X Magnification	J-STD-002, 95% Coverage
Resistance to Solder Heat	260°C for 10 seconds	MIL-STD-202, Method 210, Condition B
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215
Gross Leak	125°C Bubble Test	MIL-STD-202, Method 112, Condition D