FW2002
Product Datasheet
GaN SPDT 30W RF Switch 30MHz – 12GHz

Features

- Wide bandwidth, high power SPDT
- 30 W Pulsed/15 W CW Power Handling
- Extended low frequency operation to 9 kHz
- 150 ns Switching Time / 250 ns Settling Time
- Hot switching capable
- 3.0 mm x 3.0 mm QFN Package

Applications

- Test and Measurement systems
- L, S, C and X-Band radio and RADAR modules

Functional Block Diagram

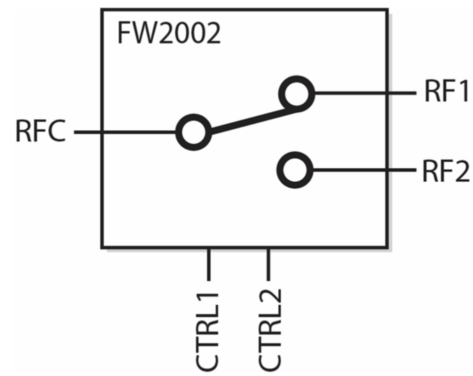

Table 1: Electrical Specifications T_a = 25 °C, Z_0 = 50 Ω, V_{ctrl} = ± 5.0 V

Parameter	Conditions	Units	Min	Typical	Max
Frequency		GHz	0.03		12
RF Pulsed Input Power	10 us pulse, 1.0 % DC, 1.0 GHz	W			30
RF CW Input Power	1.0 GHz	W			15
Compression Point Pulsed	0.1 dB, 1.0 GHz			45.6	
Compression Point CW	0.1 dB, 1.0 GHz	dBm	41.8	42.7	
Input IP3	1.0 GHz, 20 dBm	dBm		68	
Switching Time	50 % of V_{CTRL} to 10%/ 90% of RF voltage	ns		150	
Settling Time	50 % of V_{CTRL} to within 0.1 dB final power	ns		250	
Insertion Loss	30 MHz	dB		0.4	
	1.0 GHz			0.45	0.6
	3.0 GHz			0.7	
	5.0 GHz			1.0	
	6.0 GHz			1.1	
	10 GHz			1.3	
	12 GHz			1.9	

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Table 2: Electrical Specifications T_a = 25 °C, Z_0 = 50 Ω, V_{ctrl} = ± 5.0 V

Parameter	Conditions	Units	Min	Typical	Max
Video Feedthrough	50 Ω	mV_{pp}		30	
Return Loss	30 MHz	dB		29	
	1.0 GHz			20	
	3.0 GHz			22.5	
	5.0 GHz			13	
	6.0 GHz			12.5	
	10 GHz			10.5	
	12 GHz			14	
Isolation: RFC to RF1/RF2	30 MHz	dB		65	
	1.0 GHz		50	53	
	3.0 GHz			47	
	5.0 GHz			42	
	6.0 GHz			40.5	
	10 GHz			32.5	
	12 GHz			25	
Isolation: RF1/RF2 (ON port to OFF Port)	30 MHz	dB		62	
	1.0 GHz		48.5	51.5	
	3.0 GHz			43	
	5.0 GHz			38	
	6.0 GHz			36	
	10 GHz			29	
	12 GHz			23.5	

Table 3: Operational Conditions

Parameter	Conditions	Units	Min	Typical	Max
DC Control Voltage		V	-5.5		5.5
I_{CTRL} Positive Voltage		uA		150	250
I_{CTRL} Negative Voltage		nA	-500	-60	
Operating Temperature		˚C	-40		85
Operating Junction Temperature		˚C			150
Thermal Resistance	To Case Bottom	˚C /W		12	

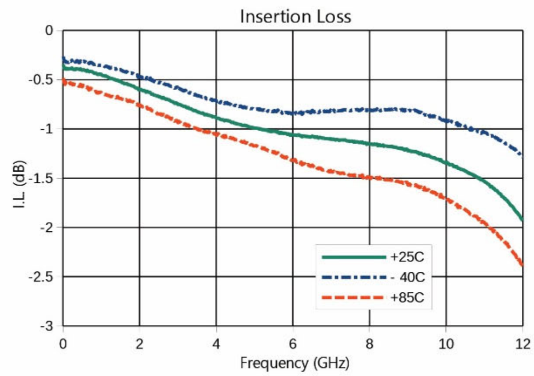
Table 4: Absolute Max Ratings

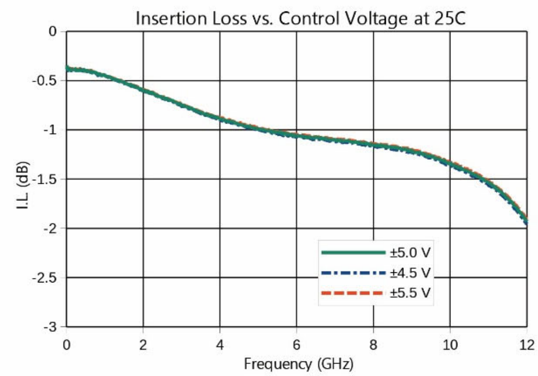
Parameter	Conditions	Units	Min	Max	Comment
DC Control Voltage		V	-10	10	
ESD RF Pins	HBM	V		250	
	CDM	V		100	
ESD non-RF Pins	HBM	V		1000	
	CDM	V		100	
Storage Temperature		˚C	-65	150	
Power Handling CW	1.0 GHz, see power handling table	dBm		42.7	
Pulsed Power Handling	10 us pulse, 1.0 % DC, 1.0 GHz	dBm		45.6	
RF Hot Switching	1.0 GHz, 10 kHz rate, RFC Input	dBm		38.8	

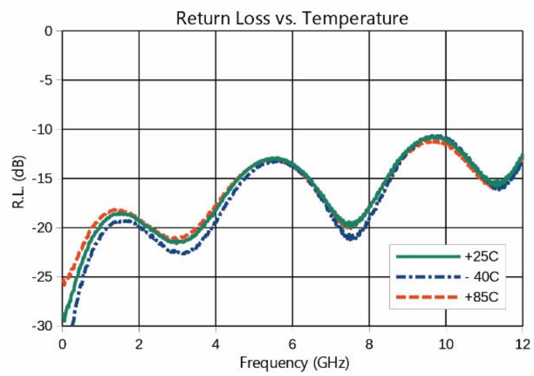
Table 5: Control Logic

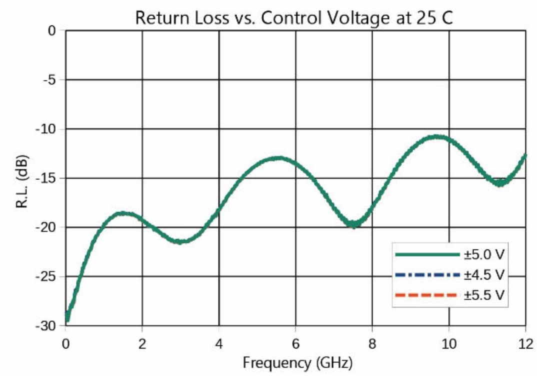
Switch State	CTRL1	CTRL2
RFC - RF1 ON	5.0 V	-5.0 V
RFC - RF2 ON	-5.0 V	5.0 V

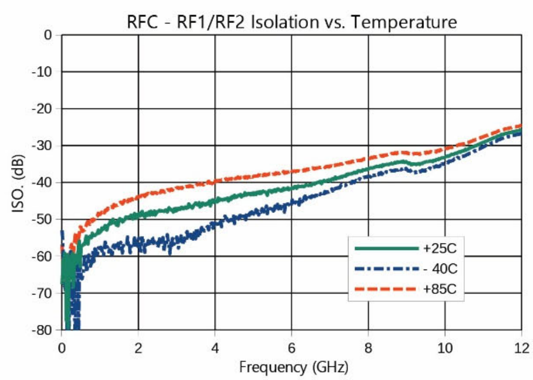
Typical Performance Data: Ta = 25 °C, Z_0 = 50 Ω, Vctrl = ± 5.0 V

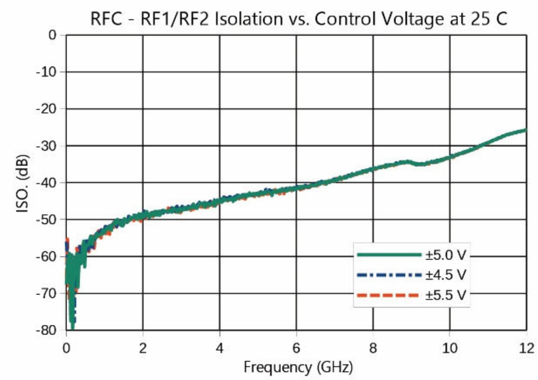


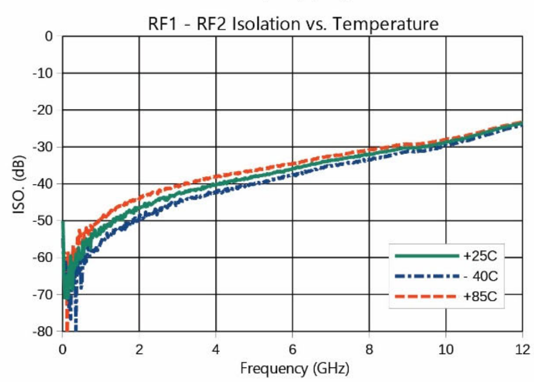


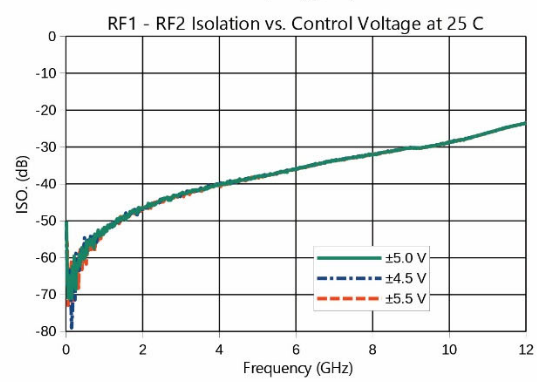




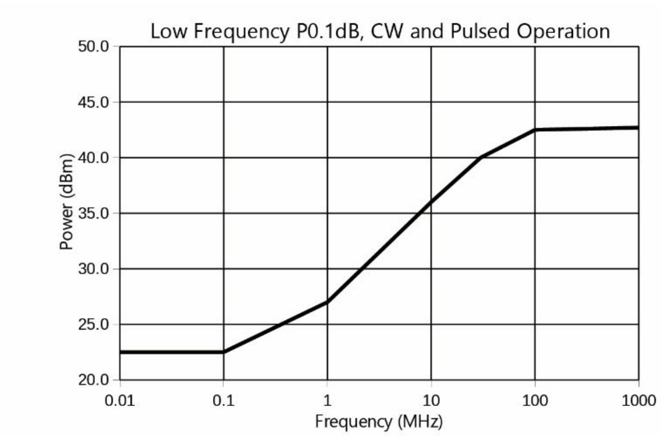


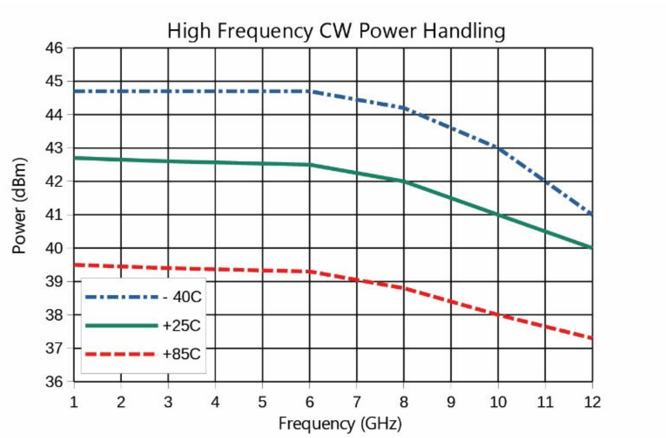






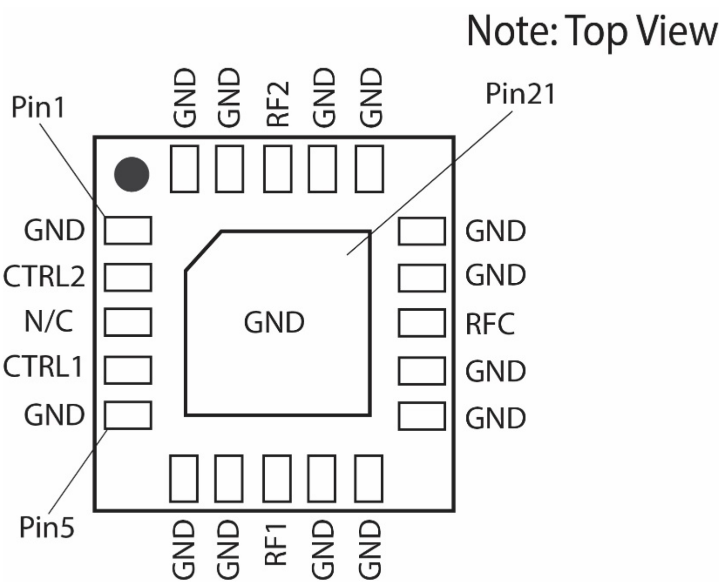
Power Handling vs. Temperature and Frequency





Note: This device is capable of extended low frequency operation down to 9 kHz at reduced power. Operating below the $P_{0.1}$ dB shown above is recommended. For high frequency operation, power handling is de-rated vs. frequency and temperature. For high power operation thermal management techniques must be used.

Pin Configuration

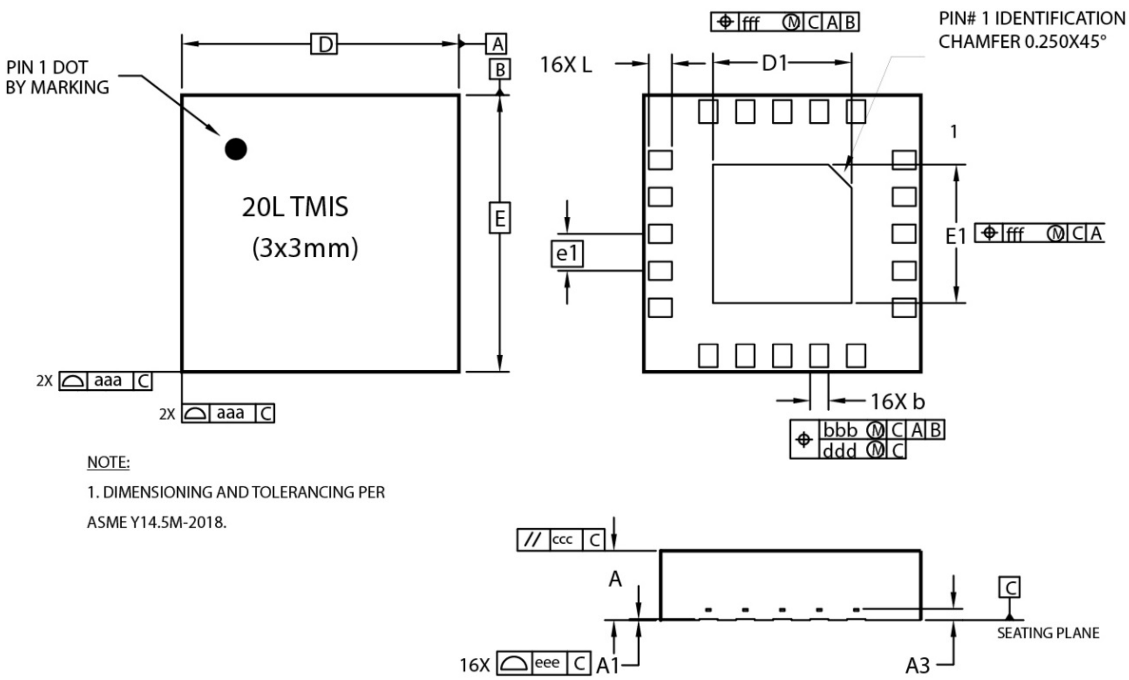


Pin Function Descriptions

Table 6: Pin Function Descriptions

Pin	Pin Name	Description
1	GND	RF Ground
2	CTRL2	Control Signal 2, see table 5
3	N/C	Not Connected, may be routed to GND
4	CTRL1	Control Signal 1, see table 5
5	GND	RF Ground
6	GND	RF Ground
7	GND	RF Ground
8	RF1	RF Port 1
9	GND	RF Ground
10	GND	RF Ground
11	GND	RF Ground
12	GND	RF Ground
13	RFC	Common RF Port
14	GND	RF Ground
15	GND	RF Ground
16	GND	RF Ground
17	GND	RF Ground
18	RF2	RF Port 2
19	GND	RF Ground
20	GND	RF Ground
21	GND	RF Ground PAD, connected to RF Ground

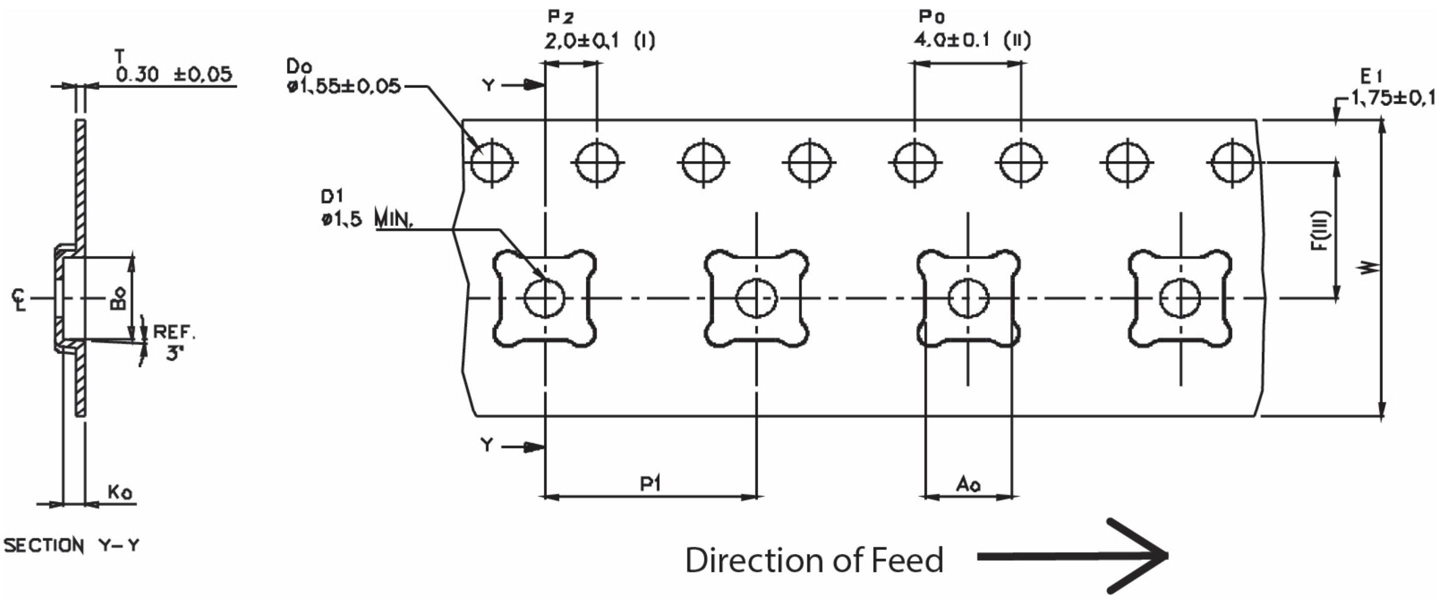
Outline Dimensions



Dimensional Ref.			
REF.	Min.	Nom	Max.
A	0.700	0.750	0.800
A1	-0.006	—	0.004
A3	0.120REF		
D	3.000 BSC		
E	3.000 BSC		
D1	1.450	1.500	1.550
E1	1.450	1.500	1.550
b	0.150	0.200	0.250
e	0.400 BSC		
L	0.200	0.250	0.300

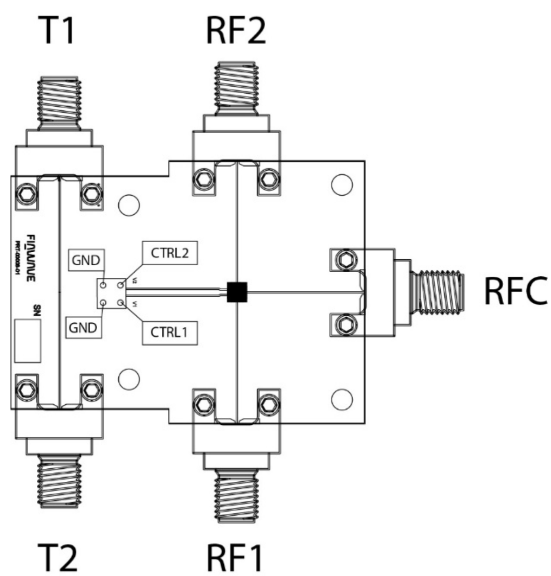
Dimensional Tol.	
aaa	0.050
bbb	0.070
ccc	0.050
ddd	0.050
eee	0.050
fff	0.100

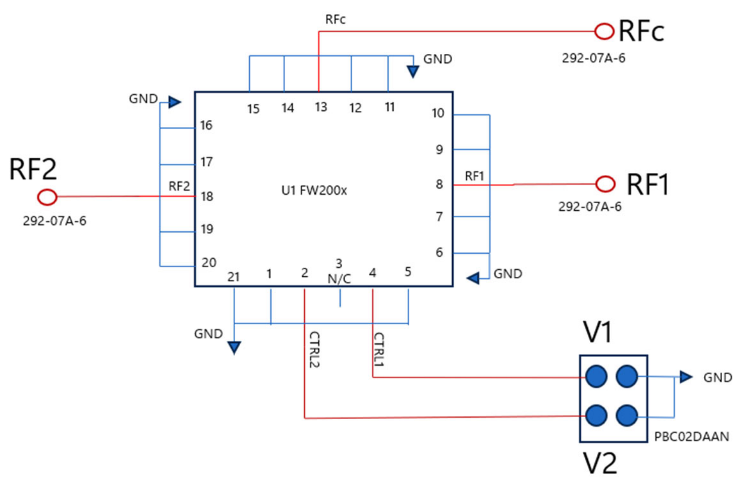
Tape and Reel Information



Ao	3.30 +/− 0.1
Bo	3.30 +/− 0.1
Ko	0.80 +/− 0.1
F	5.50 +/− 0.1
P1	8.00 +/− 0.1
W	12.00 +/− 0.3

Evaluation Board





MSL Level

Moisture Sensitivity Level 1 (MSL1)

Caution! Device may be damaged by ESD events. Please observe handling procedures for ESD sensitive devices.

Ordering Information

Order Code	ECCN	Description
FW2002	EAR99	500 Units on Tape & Reel
FW2002-EVB	EAR99	Evaluation Board
FW2002-ES	EAR99	Engineering Sample

Application Notes

Application Note	Description
APP-00002	Recommended Driver for Finwave GaN-Si Switches
APP-00004	Finwave Switches in High Altitude and Low Earth Orbit Environments

RoHS Compliance

Finwave Switches are compliant with 2011/65/EU RoHS directive, and by directive amendment 2015/863/EU. For additional information, please contact sales@finwavesemi.com