

1.0 to 7.125 GHz Broad Band SPDT Switch

■ FEATURES

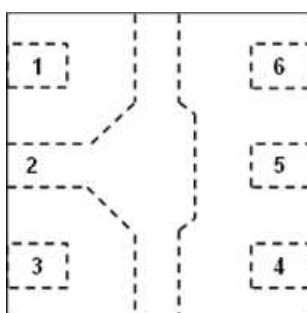
- Frequency range 1.0 to 7.125 GHz
- Operation voltage range 1.6 to 5.0 V (1.8V typ.)
- Low control voltage 1.8 V typ.
- Low insertion loss
 - 0.50 dB typ. @ $f = 2.4$ to 2.5 GHz, $V_{DD} = 1.8$ V
 - 0.50 dB typ. @ $f = 4.9$ to 5.9 GHz, $V_{DD} = 1.8$ V
 - 0.55 dB typ. @ $f = 5.9$ to 7.125 GHz, $V_{DD} = 1.8$ V
- High isolation
 - 25dB typ. @ $f = 2.4$ to 2.5 GHz, $V_{DD} = 1.8$ V
 - 25dB typ. @ $f = 4.9$ to 5.9 GHz, $V_{DD} = 1.8$ V
 - 25dB typ. @ $f = 5.9$ to 7.125 GHz, $V_{DD} = 1.8$ V
- High linearity
 - $P_{1dB} = +31$ dBm typ. @ $f = 7.125$ GHz, $V_{DD} = 1.8$ V
- Ultra small & ultra-thin Package
 - DFN6-75 (1.0 mm x 1.0 mm x 0.375 mm typ.)
- RoHS compliant and Halogen Free, MSL1

■ APPLICATION

- 802.11a/b/g/n/ac/ax networks
- Wi-Fi Module, Access points, Smartphone and others mobile devices
- Transmit/receive switching, antenna switching and others switching applications

■ BLOCK DIAGRAM (DFN6-75)

(TOP VIEW)



■ GENERAL DESCRIPTION

The NJG1818K75 is 1.8V low operating and control voltage SPDT switch intended for WLAN systems.

The NJG1818K75 features low insertion loss and high isolation for high frequency up to 7.125GHz extended by Wi-Fi 6E. Furthermore, this switch is realized high handling power performance with 1.8 V low operation voltage. Integrated ESD protection devices on each port achieve excellent ESD robustness.

Integrated DC blocking capacitors at all RF ports and the ultra-small package of DFN6-75 offer very small mounting area.

■ TRUTH TABLE

“H” = V_{CTL} (H), “L” = V_{CTL} (L)

ON PATH	V_{CTL}
PC-P1	H
PC-P2	L

■ PIN CONFIGURATION

PIN NO.	SYMBOL	DESCRIPTION
1	P1	RF terminal
2	GND	Ground terminal
3	P2	RF terminal
4	VCTL	Control signal input terminal.
5	PC	Common RF terminal
6	VDD	Voltage supply terminal

■ PRODUCT NAME INFORMATION

NJG1818 K75 (TE1)
 | | |
 Part number Package Taping form

■ ORDERING INFORMATION

PART NUMBER	PACKAGE OUTLINE	RoHS	HALOGEN-FREE	TERMINAL FINISH	MARKING	WEIGHT (mg)	MOQ (pcs.)
NJG1818K75	DFN6 -75	Yes	Yes	Ni/Pd/Au	6	1.2	5,000

■ ABSOLUTE MAXIMUM RATINGS

(General conditions: $T_a = +25^\circ\text{C}$, $Z_s = Z_L = 50\ \Omega$)

PARAMETER	SYMBOL	RATINGS	UNIT
RF input power	P_{IN}	+31 ⁽¹⁾	dBm
Supply voltage	V_{DD}	6.0	V
Control voltage	V_{CTL}	6.0	V
Power dissipation ⁽²⁾	P_D	380	mW
Operating temperature	T_{opr}	-40 to +105	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

(1): $V_{DD} = 1.8\text{ V}$, ON port

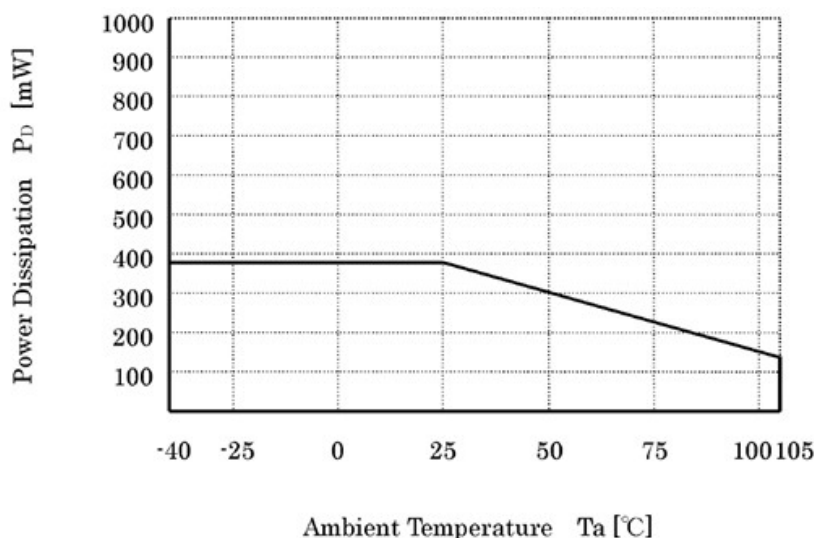
(2): Four-layer FR4 PCB (76.2 x 114.3 mm, with through-hole), $T_j = 150^\circ\text{C}$

■ POWER DISSIPATION VS.AMBIENT TEMPERATURE

Please, refer to the following Power Dissipation and Ambient Temperature.

(Please note the surface mount package has a small maximum rating of Power Dissipation [P_D], a special attention should be paid in designing of thermal radiation.)

Power Dissipation – Ambient Temperature Characteristic
Mounted on board



New Japan Radio Co., Ltd.

■ ELECTRICAL CHARACTERISTICS 1 (DC CHARACTERISTICS)

(General conditions: $T_a = +25^\circ\text{C}$, with application circuit)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply voltage	V_{DD}		1.6	1.8	5.0	V
Operating current	I_{DD}	No RF input, $V_{DD} = 1.8\text{ V}$	-	15	30	μA
Control voltage (LOW)	$V_{CTL}(\text{L})$		0	-	0.45	V
Control voltage (HIGH)	$V_{CTL}(\text{H})$		1.35	1.8	5.0	V
Control current	I_{CTL}	$V_{CTL}(\text{H}) = 1.8\text{ V}$	-	4	10	μA

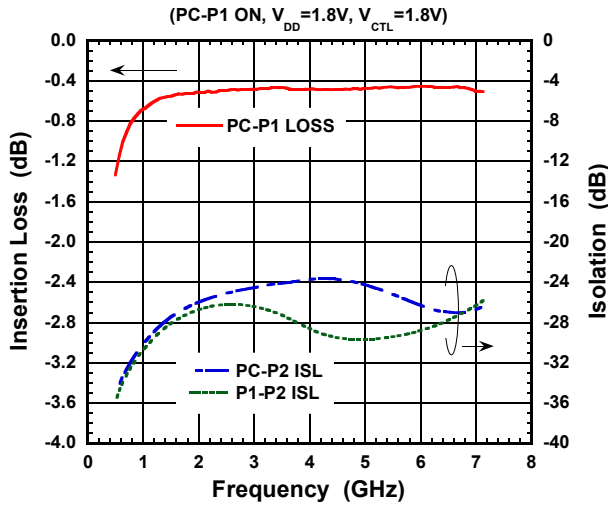
■ ELECTRICAL CHARACTERISTICS 2 (RF CHARACTERISTICS)

(General conditions: $T_a = +25^\circ\text{C}$, $Z_s = Z_L = 50\ \Omega$, $V_{DD} = 1.8\text{ V}$, $V_{CTL}(\text{H}) = 1.8\text{ V}$, $V_{CTL}(\text{L}) = 0\text{ V}$, with application circuit)

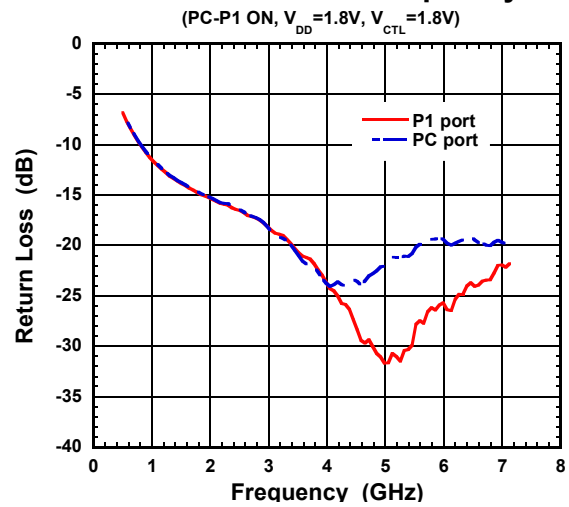
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Insertion loss	LOSS	$f = 2.4\text{ to }2.5\text{ GHz}$	-	0.50	0.70	dB
		$f = 4.9\text{ to }5.9\text{ GHz}$	-	0.50	0.70	
		$f = 5.9\text{ to }7.125\text{ GHz}$	-	0.55	0.75	
Isolation	ISL	$f = 2.4\text{ to }2.5\text{ GHz}$	23	25	-	dB
		$f = 4.9\text{ to }5.9\text{ GHz}$	22	25	-	
		$f = 5.9\text{ to }7.125\text{ GHz}$	22	25	-	
Return loss	RL	$f = 2.4\text{ to }2.5\text{ GHz}$	13	16	-	dB
		$f = 4.9\text{ to }5.9\text{ GHz}$	14	19	-	
		$f = 5.9\text{ to }7.125\text{ GHz}$	14	19	-	
Input power at 1dB compression point	$P_{-1\text{dB}}$	$f = 2.4\text{ to }7.125\text{ GHz}$	+28	+31	-	dBm
Switching time	T_{SW}	50% V_{CTL} to 10/90% RF	-	200	400	ns

■ ELECTRICAL CHARACTERISTICS

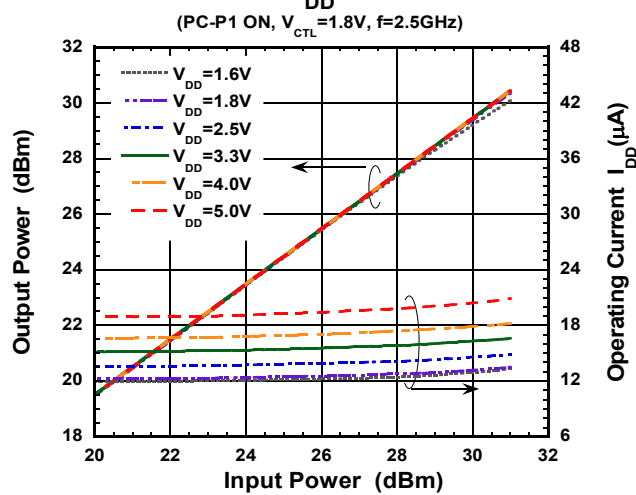
Loss, ISL vs Frequency



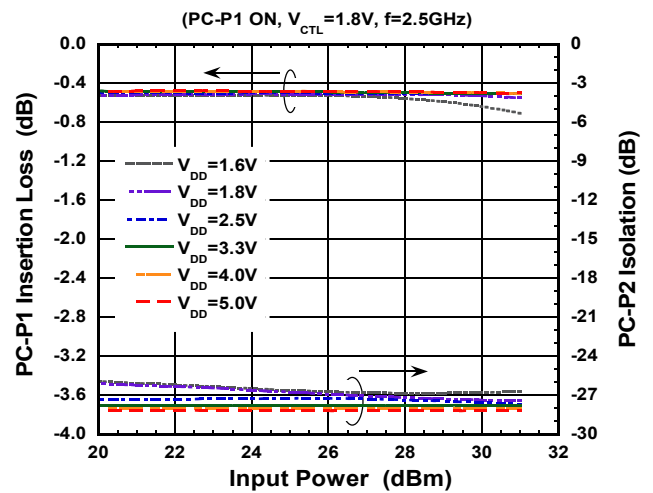
Return Loss vs Frequency



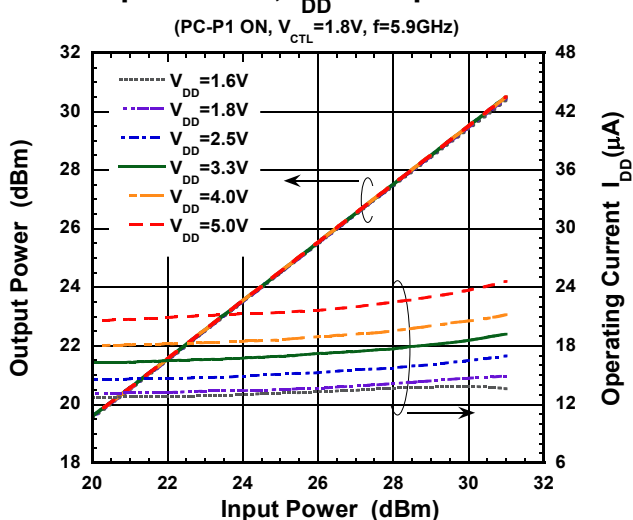
Output Power, I_{DD} vs Input Power



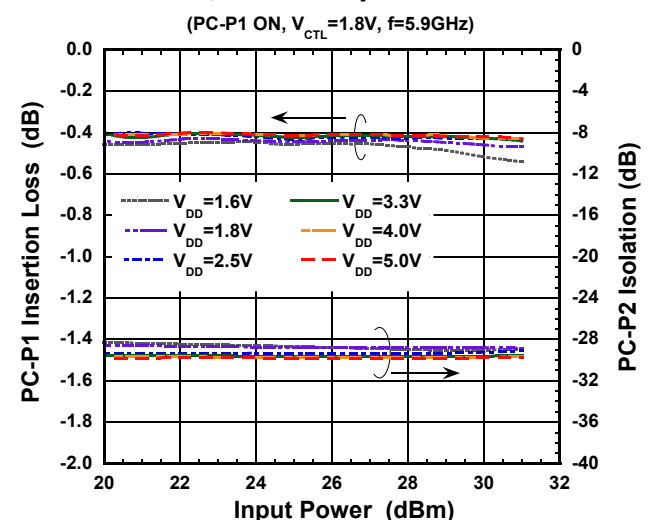
Loss, ISL vs Input Power



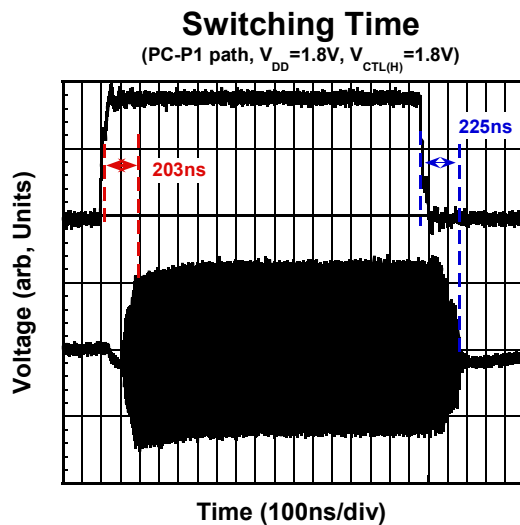
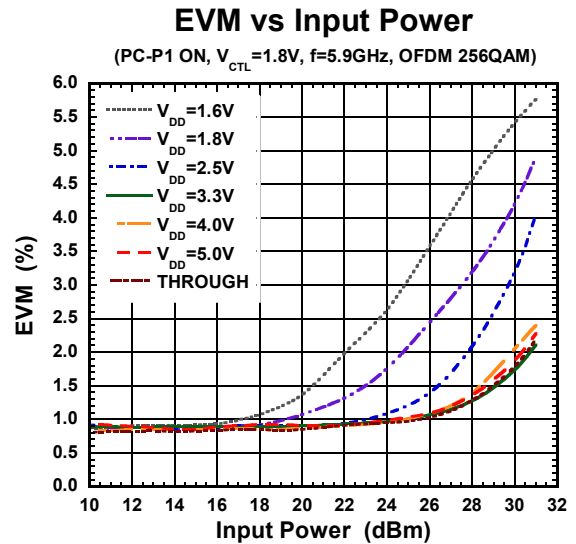
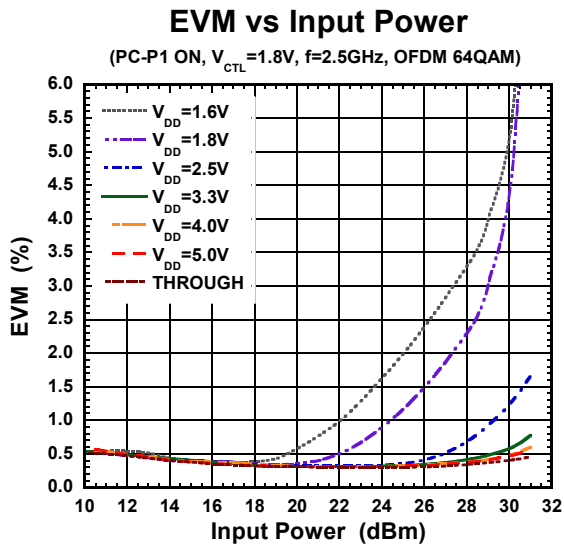
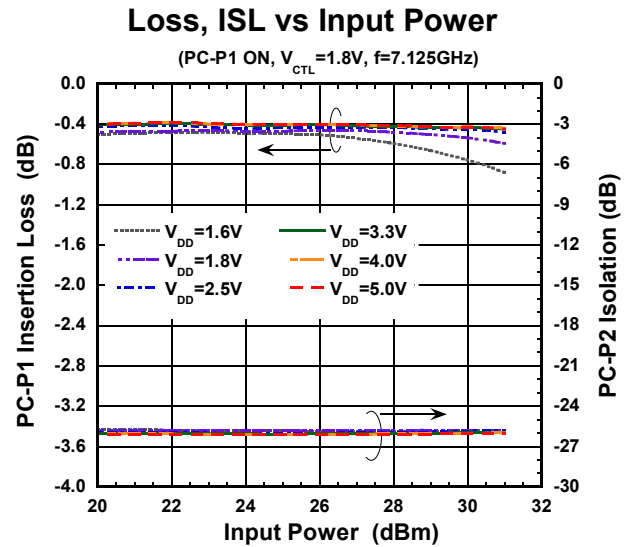
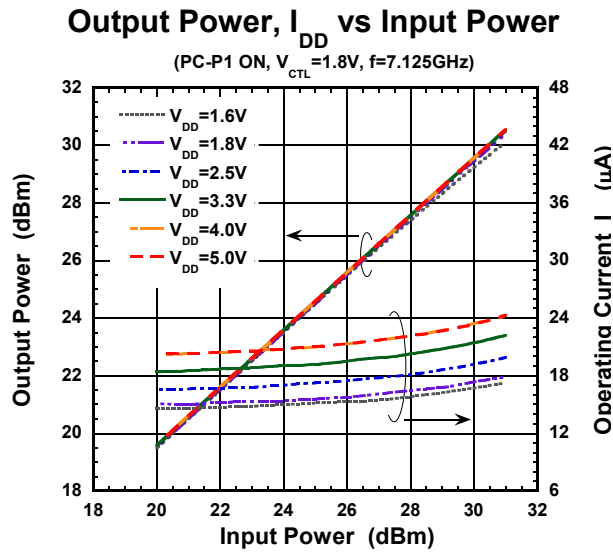
Output Power, I_{DD} vs Input Power



Loss, ISL vs Input Power

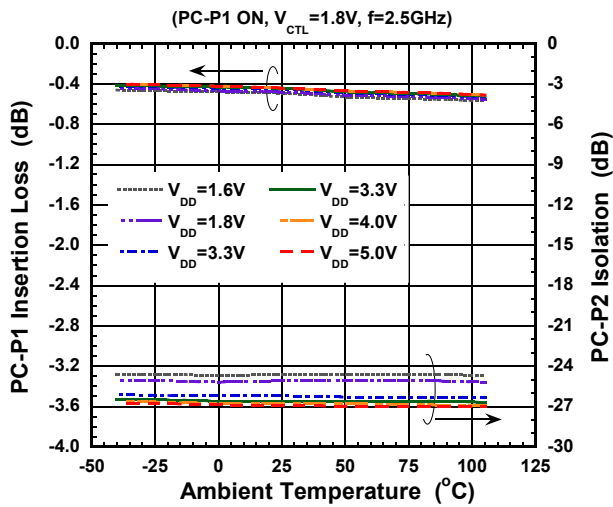


■ ELECTRICAL CHARACTERISTICS

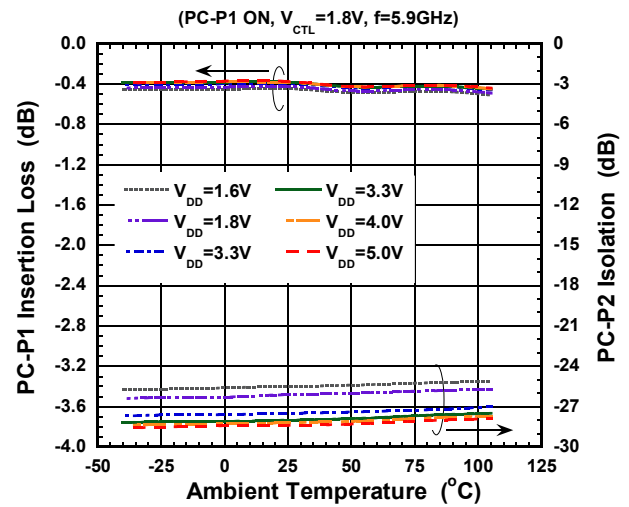


■ ELECTRICAL CHARACTERISTICS

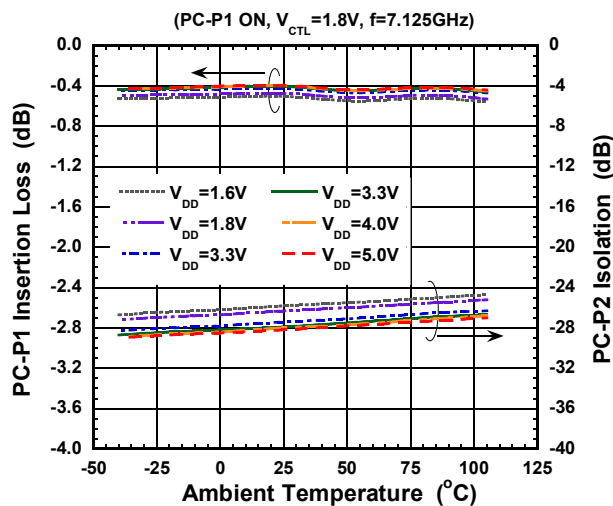
Loss, ISL vs Temperature



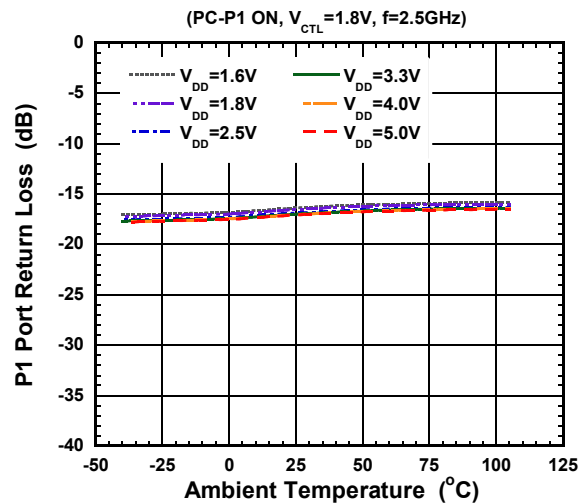
Loss, ISL vs Temperature



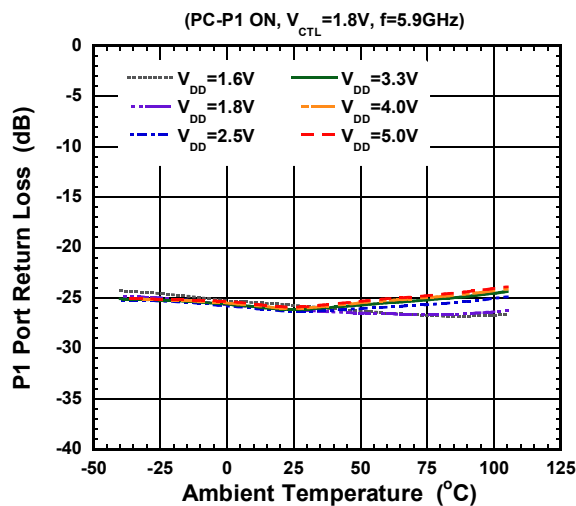
Loss, ISL vs Temperature



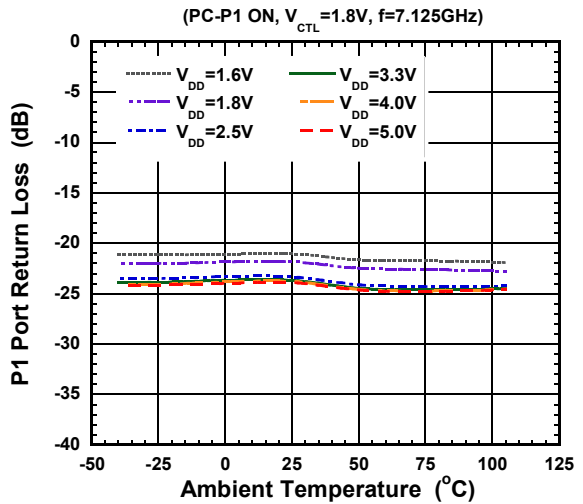
Return Loss vs Temperature



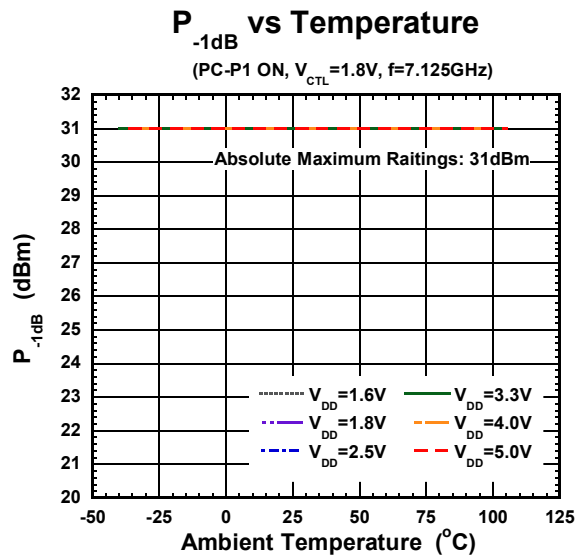
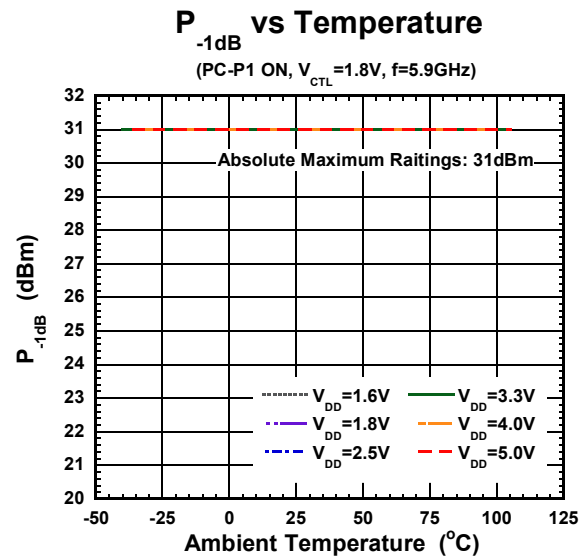
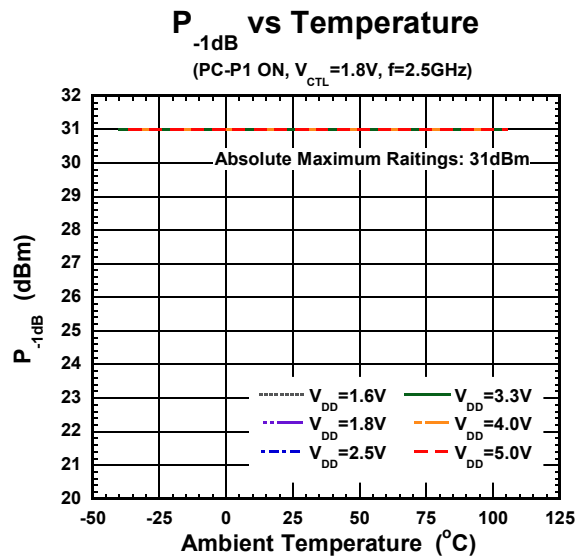
Return Loss vs Temperature



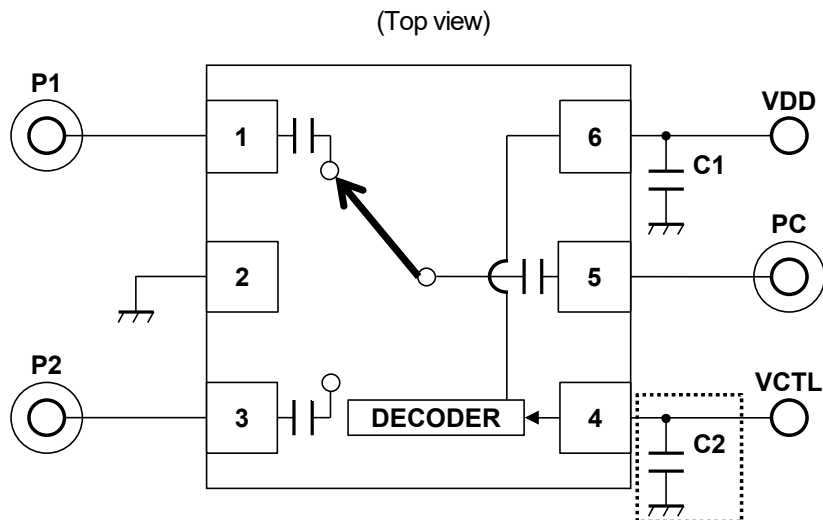
Return Loss vs Temperature



■ ELECTRICAL CHARACTERISTICS



■ APPLICATION CIRCUIT



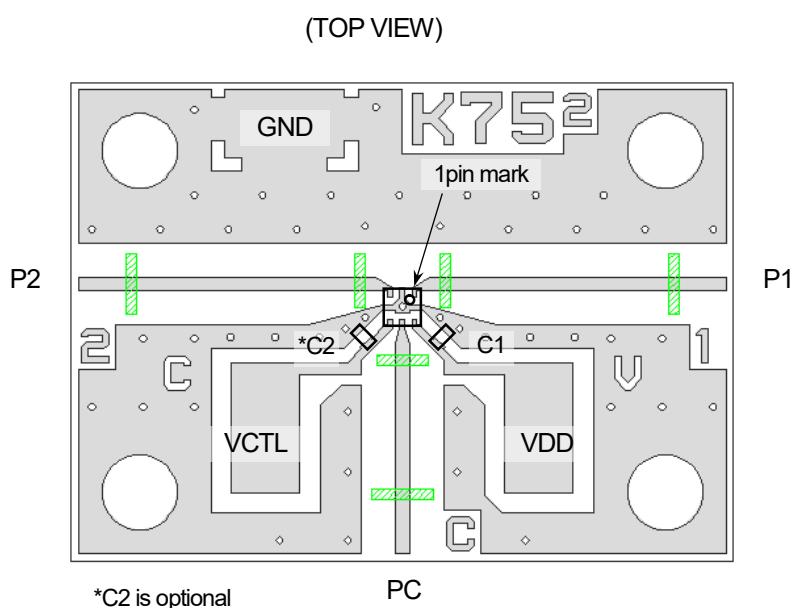
NOTE:

The bypass capacitor C2 is optional, and is recommended only when the control line is affected under noisy environment.

■ PARTS LIST

Part ID	Value	Notes
C1	1000 pF	MURATA MFG (GRM03 Series)
C2	10 pF	

■ EVALUATION BOARD

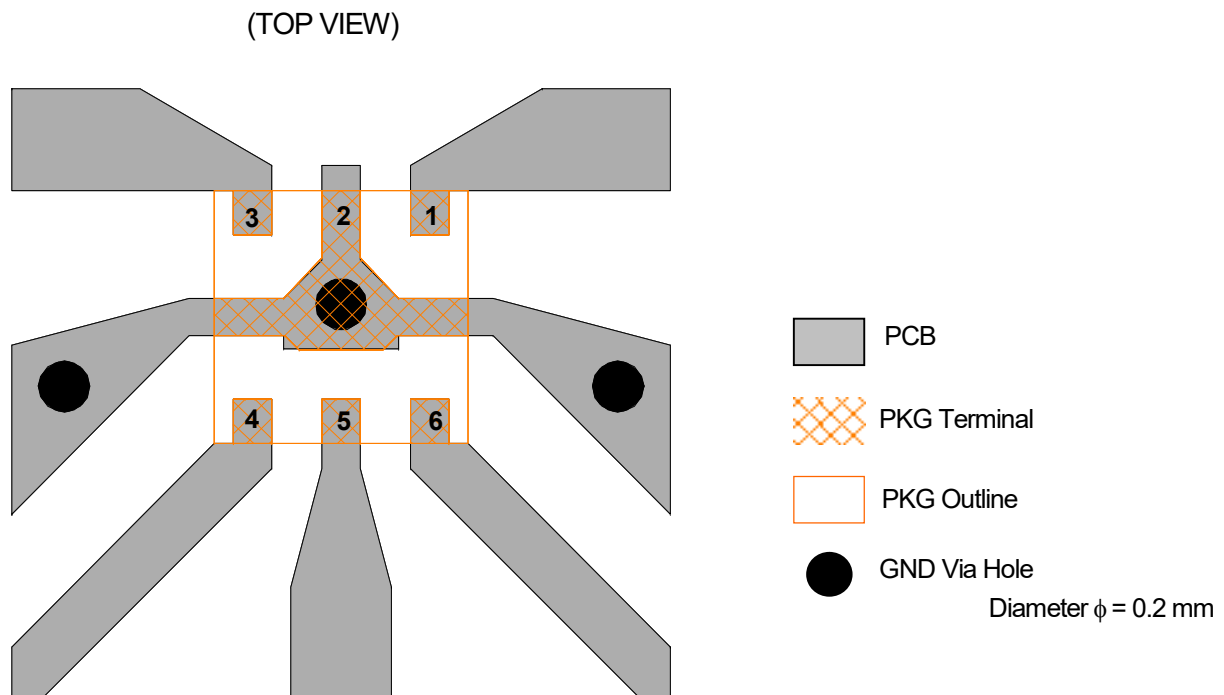


PCB: FR-4, t = 0.2 mm
 Capacitor size: 0603 (0.6 x 0.3 mm)
 Strip line width: 0.4 mm
 PCB size: 19.4 x 14.0 mm
 Through hole diameter: 0.2 mm

■ Loss of PCB and connectors

Frequency (GHz)	Loss (dB)
2.4	0.38
2.5	0.39
4.9	0.61
5.9	0.77
7.125	0.85

■ PCB LAYOUT GUIDELINE



PRECAUTIONS

For good RF performance, exposed pad should be connected to PCB ground plane as close as possible.

■ **RECOMMENDED FOOTPRINT PATTERN (DFN6-75)** <Reference>

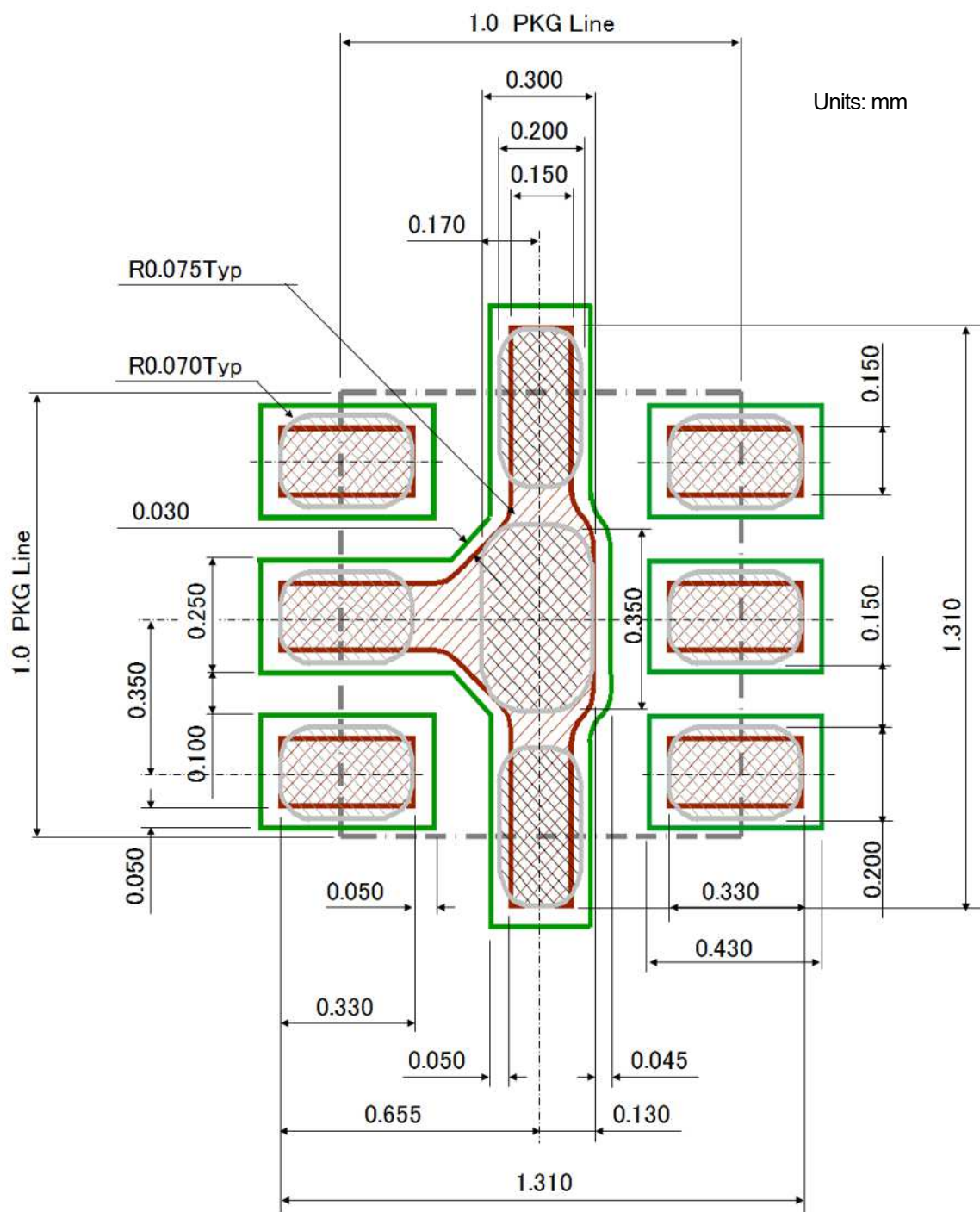
Package: 1.0 mm x 1.0 mm

Pin pitch: 0.35 mm

 : Land

 : Mask (Open area) *Metal mask thickness: 100 μm

 : Resist (Open area)



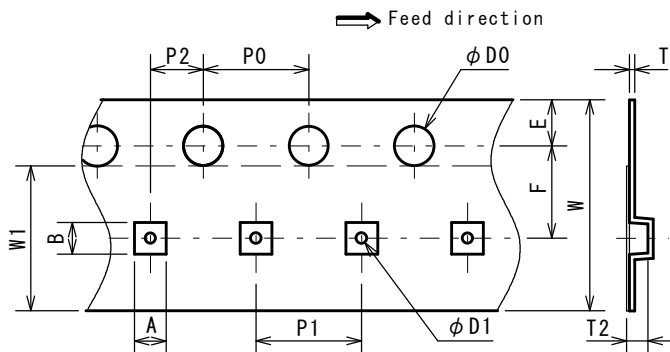
[illegible]

SUBSTRATE MATERIAL : Copper
 TERMINAL FINISH : Ni/Pd/Au plating
 MOLD MATERIAL : Epoxy resin
 MASS (TYP.) : 1.2 (mg)

UNIT : mm

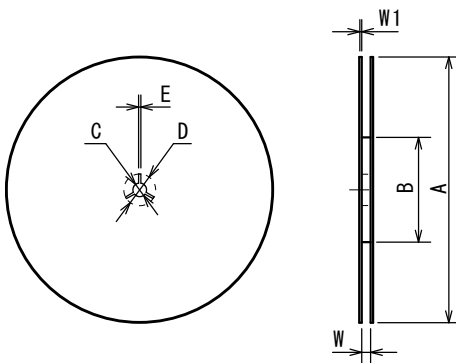
■ PACKING SPECIFICATION (DFN6-75)

TAPING DIMENSIONS



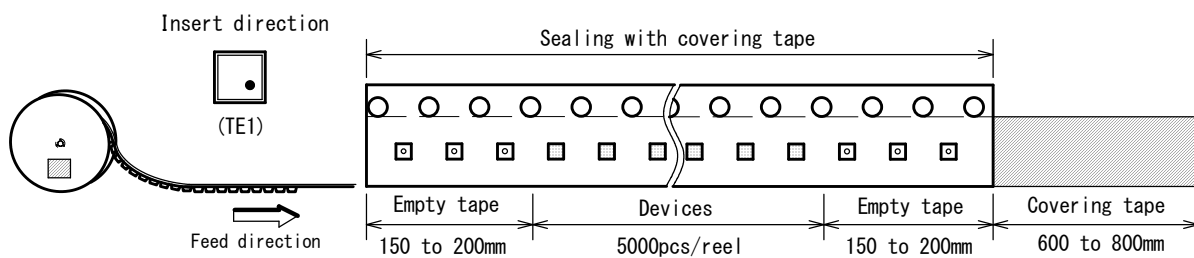
SYMBOL	DIMENSION	REMARKS
A	$1.19^{+0.04}_{-0.01}$	BOTTOM DIMENSION
B	$1.19^{+0.04}_{-0.01}$	BOTTOM DIMENSION
D0	$1.5^{+0.1}_0$	
D1	0.5 ± 0.05	
E	1.75 ± 0.1	
F	3.5 ± 0.05	
P0	4.0 ± 0.1	
P1	4.0 ± 0.1	
P2	2.0 ± 0.05	
T	0.18 ± 0.05	
T2	0.69 ± 0.1	
W	8.0 ± 0.1	
W1	5.5 ± 0.1	THICKNESS 60 μ max

REEL DIMENSIONS

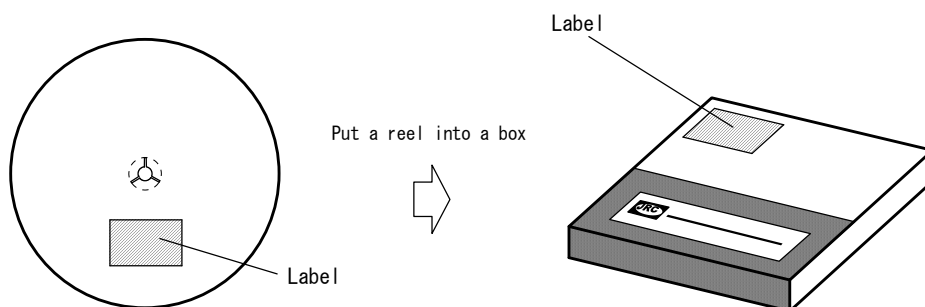


SYMBOL	DIMENSION
A	$\phi 180^{+0}_{-3}$
B	$\phi 60^{+1}_0$
C	$\phi 13 \pm 0.2$
D	$\phi 21 \pm 0.8$
E	2 ± 0.5
W	9 ± 0.3
W1	1.2

TAPING STATE



PACKING STATE



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