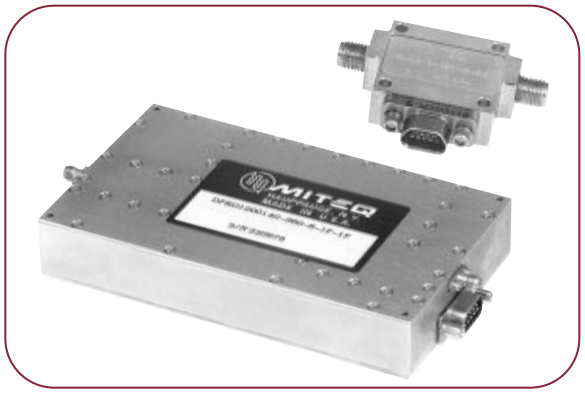
DIGITAL PHASE SHIFTERS

FEATURES

- **Optimized for fast switching speeds (down to 20 ns maximum)**
- **Optimized for lowest phase deviation over band**
- **RMS phase error ≤3° typical**
- **Low insertion loss**
- **Power handling up to 30 dBm**
- **OIP3 (typically 25 dBm)**
- **Hermetic sealing available**



MITEQ offers a 6 bit, 6 to 18 GHz digital phase shifter operating as high as 18 GHz for EW applications. This product offers exceptional power handling capability in excess of 25 dBm and switching speed of 20 ns maximum. This device is ideally suited for phased array applications and interferometric receivers. We also offer a number of narrowband analog phase shifters denoted in the Analog Phase Shifter Section that utilize switched line and reflection phase shifter topologies.

8 BIT, 650–1550 MHz

DPS-00650155-180-8-IF-IF	
Frequency range	650–1550 MHz 0 to 180° in 1.4° steps @ 650 MHz
Peak Phase error	±1° maximum
Phase	(phase changes linearly w/frequency)
Insertion phase variation	±2 dB maximum
Insertion loss	1.5 dB typical, 1.7 dB maximum
Input/output VSWR	1.3:1 maximum
Power	20 Watts CW, 300 Watts Peak
Speed	300 ns maximum
Size	5.65" [143.51 mm] x 2.5" [63.5 mm] x 0.56" [14.22 mm]
DC input	+5/-15 V

6 BIT, 1.2–1.4 GHz

DPS-01200140-360-6-1F-1F	
Frequency range	1.2–1.4 GHz
Insertion loss	3.5 dB maximum
Insertion loss variation over phase range	±3 dB maximum
Phase shift	0–360° minimum
Phase error	±3° maximum
Switching speed	200 ns maximum
Input/output VSWR	1.65:1 maximum
RF input power (working)	+10 dBm maximum
RF input power (no damage)	+20 dBm maximum
Outline drawing	174343

4 BIT, 2.9–3.1 GHz

DPS-02900310-360-2-1F-1F	
Phase states	4 0° (Ref.), 22.5°, 45°, 90°, 180°
Frequency range	2.9–3.1 GHz
Insertion loss	3 dB maximum
Input/output VSWR	1.5:1 maximum
Switching speed	25 ns maximum
Phase accuracy	1° maximum
Amplitude accuracy	0.25 dB maximum
Control	TTL, "0" = Path on
Outline drawing	174339

6 BIT, 3.1–3.7 GHz

DPS-03100370-360-6-1F-1F	
Frequency range	3.1–3.7 GHz
Peak phase error	±2° maximum
Phase	0–360° in 5.6° steps
Insertion phase variation	±2 dB maximum
Insertion loss	1.2 dB typical, 1.4 dB maximum
Input/output VSWR	1.4:1 maximum
Power	50 Watts CW maximum
Speed	0.5 ms maximum
Size	2.5" [63.5 mm] x 1.5" [38.1 mm] x 0.5" [12.7 mm]
DC input	+5/-15 V

DIGITAL PHASE SHIFTERS (CONT.)

3 BIT, 9–10 GHz

DPS-09001000-360-3-1F-1F	
Phase states	0° (Ref.), 90°, 180°, 270°
Frequency range	9–10 GHz
Insertion loss	7 dB maximum
Input/output VSWR	1.7:1 maximum
Switching speed	20 ns maximum
Phase accuracy	±5° maximum
Amplitude balance	±0.5 dB maximum
Control	TTL, 2 lines
Logic truth table	E1 E2 Phase 0 0 0° 0 1 90° 1 0 180° 1 1 270°
DC power	±5 V @ 50 mA maximum
Outline drawing	174339

6 BIT, 7–14 GHz

DPS-07001400-360-6-IF-IF	
RF frequency range	7–14 GHz
Insertion loss	10.5 dB typical, 11 dB maximum
Input/output VSWR	2.5:1 maximum
Phase shift	360° maximum
Phase shift step size	5.6° minimum
Phase error	3° typical midband, 6° maximum
Input third order intercept	40 dBm typical, 35 dBm maximum
DC power	+5 VDC
Control input	6-bit TTL
Outline drawing	174340

4 and 6 BIT, 0–360°, 5.03–5.09 GHz Design Family

Parameters	Option #1 Low Loss 22.5° Steps (Typ.)	(Max.)	Option #2 High Stability 22.5° Steps (Typ.)	(Max.)	Option #3 High Stability 5.6° Steps (Typ.)	(Max.)
Peak phase error	2°	2.5°	2°	2.5°	2.7°	3.3°
Phase	1.3°	1.5°	1.3°	1.5°	1.2°	1.4°
Insertion phase vs. temperature	0.3°/°C	1°/°C	0.05°/°C	0.1°/°C	0.05°/°C	0.1°/°C
Insertion phase variation unit to unit	±3°	±5°	±3°	±5°	±3°	±5°
Insertion loss, maximum	1.4 dB	1.5 dB	1.65 dB	1.75 dB	1.75 dB	1.85 dB
Insertion loss vs. phase and frequency	0.4 dB	0.5 dB	0.4 dB	0.5 dB	0.45 dB	0.6 dB
Loss Δ at any phase setting unit to unit	±0.18 dB	±0.25 dB	±0.18 dB	±0.25 dB	±0.25 dB	±0.3 dB
Operating power level	4W CW	10W CW	4W CW	10W CW	4W CW	10W CW
Switching speed	0.2 us	0.5 us	0.2 us	0.5 us	0.2 us	0.5 us
DC input	+5/-15 V		+5/-15 V		+5/-15 V	

DPS-06001800-360-6-5.6	
RF frequency range	6–18 GHz
Insertion loss	15.5 dB maximum
Input/output VSWR	3:1 maximum
Phase shift	360° maximum
Phase shift step size	5.6° minimum
Phase error	3° typical midband, 6° maximum
Input third order intercept	40 dBm typical, 35 dBm maximum
DC power	+5 VDC
Control input	6-bit TTL
Outline drawing	174340

ORDERING INFORMATION

To order a digital phase shifter, please include the model number derived from the following table. If requesting a quotation for a phase shifter not listed in this catalog, please consult MITEQ. Include any additional specifications that are not listed when creating the model number.

DPS *-06001800* *-360* *-6* *-1F1F* *S*

Digital Phase Shifter

Frequency Range
Start and stop sequentially rounded to the nearest MHz.
Example: 6 to 18 GHz would be 06001800

Phase Range
Example: 360 degrees would be -360

Number Of Bits
-3 . . . . . 3 bit
-4 . . . . . 4 bit
-6 . . . . . 6 bit

Input Connector
SMA **1**
GPO **2**
Please add F for female or M for male.

Output Connector
SMA **1**
GPO **2**
Please add F for female or M for male.

Special Technical Specification Requirements
If required they must be denoted on the purchase order . . . . . **S**

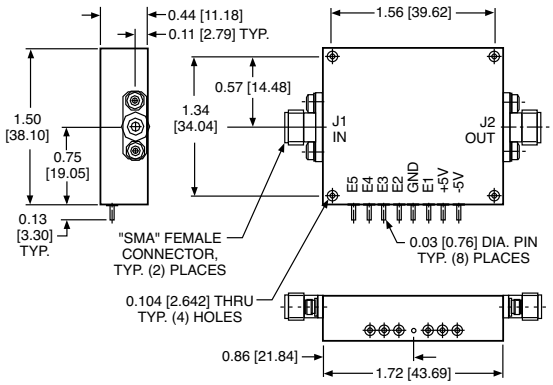
Using the above information to order or request a phase shifter with other technical requirements placed in the purchase order or in the RFQ documentation would result in ordering a DPS-06001800-360-6-1F1FS, a 6 to 18 GHz, 180° digital phase shifter with other technical requirements denoted on purchase order. Other special technical specification requirements would typically be switching speed, in/out VSWR, IIP3, size, etc.

ENVIRONMENTAL CONDITIONS

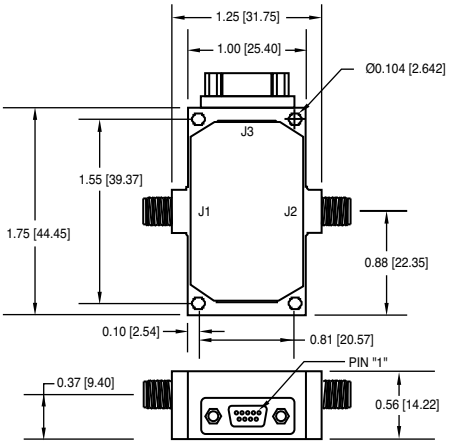
Operating temperature	0 to 70°C
Storage temperature	-30 to +85°C
Humidity	95% noncondensing
Vibration	12 g's rms, 20-2000 Hz per MIL-STD-810B Method 514, Procedure 5

DIGITAL AND ANALOG PHASE SHIFTER OUTLINE DRAWINGS

174339

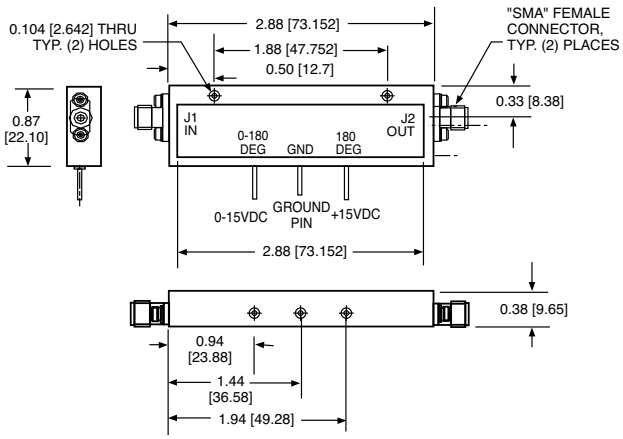


174340



13 PIN OUT	
PIN NUMBER	FUNCTION (DEG.)
1	180°
2	90°
3	45°
4	22.5°
5	11.25°
6	5.6°
7	GND
8	+5 VDC
9	not used

174341

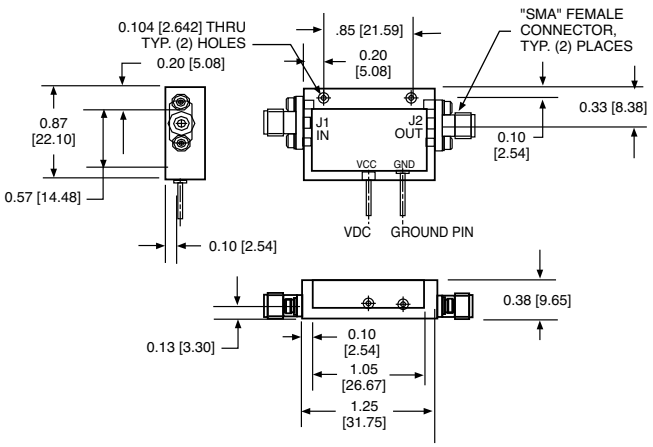


GENERAL NOTES:

1. Dimensions shown in brackets [ ] are in millimeters.
2. Unless specified, all connectors are type SMA female field replaceable.
3. Tolerance as follows:

DIGITAL AND ANALOG PHASE SHIFTER OUTLINE DRAWINGS (CONT.)

174342



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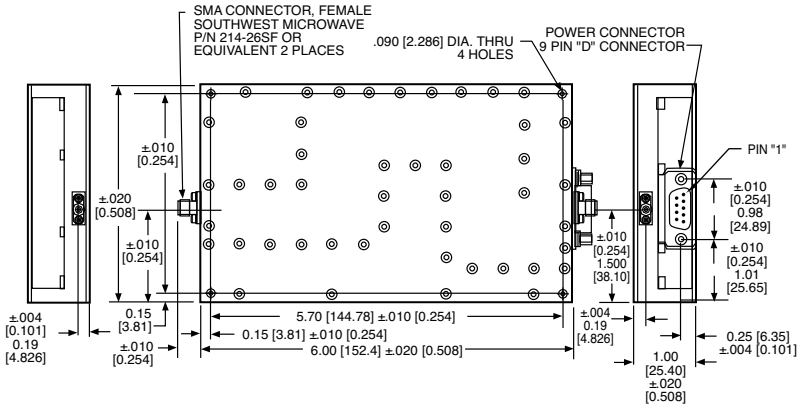
POWER CONNECTOR PIN ASSIGNMENTS	
PIN	DESIGNATION
1	5.625°
2	11.25°
3	22.5°
4	45°
5	90°
6	180°
7	GND
8	+15V
9	-15V



GENERAL NOTES:

1. Dimensions shown in brackets [ ] are in millimeters.
2. Unless specified, all connectors are type SMA female field replaceable.
3. Tolerance as follows:
   .xx = ±0.01 [.xx = ±0.25]
   .xxx = ±0.005 [.xxx = ±0.13]