

Nano-Power, RRIO, 2.3V, Push-Pull Output Comparator with Voltage Reference

FEATURES

- Low supply current: 3.5 μ A (TYP) at $V_s=2.3V$
- Supply Range: +2.3V to +5.5V
- Integrated Voltage Reference: 1.2V
- Low input offset voltage: $V_{os(max)} = 3.5mV$ at $V_s=5V$
- Rail-to-Rail Input
- Push-Pull Output
- Operating Temperature Range: -40°C to +85°C
- *Micro* SIZE PACKAGES: SOT23-6, DFN1.6*1.6-6L

APPLICATIONS

- RC TIMERS
- MULTIVIBRATORS
- WINDOW DETECTORS
- SYSTEM MONITORING
- SENSOR SYSTEMS: Smoke Detectors, Light Sensors, Alarms

DESCRIPTION

The RS8912 is a push-pull output comparator. It features an uncommitted on-chip voltage reference and have low quiescent current, input common-mode range 200mV beyond the supply rails, and single-supply operation from 2.3V to 5.5V. The integrated 1.2V series voltage reference offers low 42 μ V/°C drift, is stable with up to 10nF capacitive load, and can provide up to 350 μ A (TYP) of output current.

Featuring a push-pull output stage, the RS8912 allows for operation with absolute minimum power consumption when driving any capacitive or resistive load.

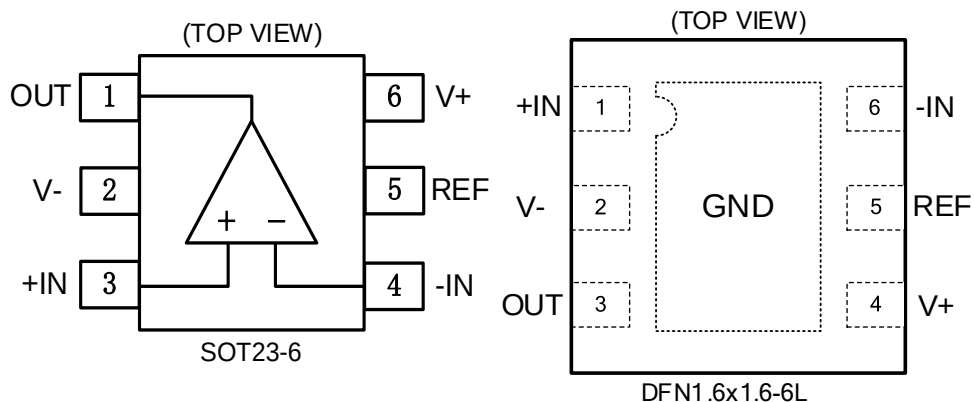
The RS8912 is available in Green SOT23-6 and DFN1.6*1.6-6L package, it is specified at the full temperature range of -40°C to +85°C.

Device Information ⁽¹⁾

PART NUMBER	PACKAGE	BODY SIZE (NOM)
RS8912	SOT23-6	1.60mm $\times$ 2.92mm
	DFN1.6*1.6-6L	1.60mm $\times$ 1.60mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

Pin Configuration and Functions (Top View)



Pin Description

NAME	PIN		I/O ⁽¹⁾	DESCRIPTION
	SOT23-6	DFN1.6x1.6-6L		
OUT	1	3	O	Output
V-	2	2	P	Negative (lowest) power supply
+IN	3	1	I	Noninverting input
-IN	4	6	I	Inverting input
REF	5	5	O	Voltage Reference
V+	6	4	P	Positive (highest) power supply

(1)I=Input, O=Output, P=Power

SPECIFICATIONS

Absolute Maximum Ratings

Over operating free-air temperature range (unless otherwise noted) ⁽¹⁾

		MIN	MAX	UNIT
Voltage	Supply, $V_s=(V+) - (V-)$		7	V
	Input pin (IN+, IN-) ⁽²⁾	(V-)-0.5	(V+) +0.5	
	Signal output pin ⁽³⁾	(V-)-0.5	(V+) +0.5	
Current	Signal input pin (IN+, IN-) ⁽²⁾	-10	10	mA
	Signal output pin ⁽³⁾	-10	10	mA
	Output short-circuit ⁽⁴⁾	Continuous		
Temperature	Operating range, T_A	-40	85	°C
	Junction, T_J		150	
	Storage, T_{stg}	-65	150	

(1) Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those specified is not implied.

(2) Input terminals are diode-clamped to the power-supply rails. Input signals that can swing more than 0.5V beyond the supply rails should be current-limited to 10mA or less.

(3) Output terminals are diode-clamped to the power-supply rails. Output signals that can swing more than 0.5V beyond the supply rails should be current-limited to ± 10 mA or less.

(4) Short-circuit to ground, one amplifier per package.

ESD Ratings

		VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human-body model (HBM)	± 3000
		Machine Model (MM)	± 200

Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted)

		MIN	NOM	MAX	UNIT
Supply voltage, $V_s= (V+) - (V-)$	Single-supply	2.3		5.5	V
	Dual-supply	± 1.15		± 2.75	

Thermal Information:RS8912

THERMAL METRIC ⁽¹⁾		RS8912	UNIT
		6PINS	
		SOT23-6	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	214.7	°C/W
$R_{\theta JC(top)}$	Junction-to-case(top) thermal resistance	127.1	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	60.0	°C/W
Ψ_{JT}	Junction-to-top characterization parameter	33.4	°C/W
Ψ_{JB}	Junction-to-board characterization parameter	59.8	°C/W
$R_{\theta JC(bot)}$	Junction-to-case(bottom) thermal resistance	N/A	°C/W

PACKAGE/ORDERING INFORMATION

Orderable Device	Package Type	Pin	Channel	Op Temp(°C)	Device Marking ⁽¹⁾	Package Qty
RS8912XH	SOT23-6	6	1	-40°C~85°C	8912	Tape and Reel,3000
RS8912XUTDL6	DFN1.6*1.6-6L	6	1	-40°C~85°C	8912	Tape and Reel,3000

NOTE:

- (1) There may be additional marking, which relates to the lot trace code information(data code and vendor code), the logo or the environmental category on the device.

ELECTRICAL CHARACTERISTICS: $V_S=2.3V$

(At $T_A = +25^{\circ}C$, $V_+=2.3V$, $V_-=0V$, $V_{CM}=V_S/2$, unless otherwise noted.)

PARAMETER		CONDITIONS	RS8912			UINTS
			MIN	TYP	MAX	
POWER SUPPLY						
Vs	Operating Voltage Range		2.3		5.5	V
Iq	Quiescent Current			3.5	8	μA
PSRR	Power-Supply Rejection Ratio	Vs=2.3V to 5.5V, VCM=(V)+0.5V		70		dB
INPUT						
Vos	Input Offset Voltage	VCM =0V		1	5	mV
		VCM =2.3V		1	5	
ΔVos/ΔT	Input Offset Voltage Drift	VCM =Vs/2, -40°C ≤ TA ≤85°C		2		μV/°C
IB	Input Bias Current			1	10	pA
VCM	Common-Mode Voltage Range	TA = −40°C to 85°C	(V-)-0.1		(V+)+0.1	V
CMRR	Common-Mode Rejection Ratio	VCM =0V to 2.3V		70		dB
OUTPUT						
VOH	Output Swing From Upper Rail	Io=25uA	2.208	2.237		V
		Io=95uA	2.011	2.095		
VOL	Output Swing From Lower Rail	Io=25uA		55	80	mV
		Io=95uA		205	289	
ISC	Short Circuit Sink Current	Vs=2.3V		-1	-0.62	mA
	Short Circuit Source Current	Vs=2.3V	0.57	1		mA
SWITCHING						
TPHL	Propagation Delay H To L	Overdrive = 10 mV		135		μs
		Overdrive = 100 mV		21		
TPLH	Propagation Delay L To H	Overdrive = 10 mV		123		μs
		Overdrive = 100 mV		40		
TR	Rise Time	Overdrive = 100 mV		30		us
TF	Fall Time	Overdrive = 100 mV		30		us
	Noise of VREF	f=0.1Hz to 10Hz		20		uVRMS
VOLTAGE REFERENCE						
VREF	Reference Voltage	IREF=0mA	1.176	1.200	1.224	V
	Reference Voltage Drift			42		μV/°C
	Reference Output Current (Source)		60	80		uA

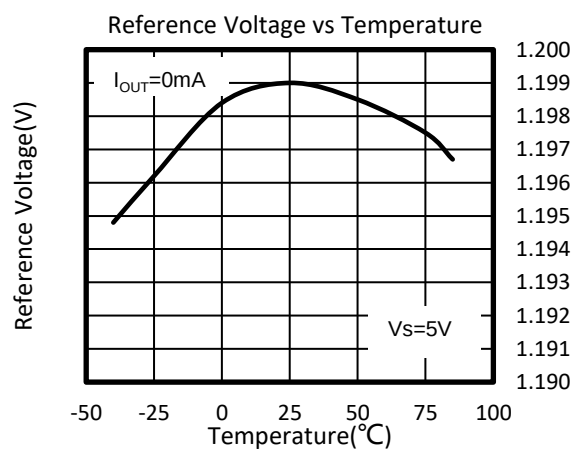
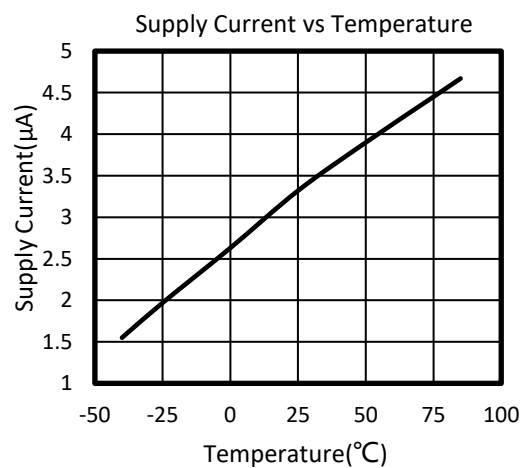
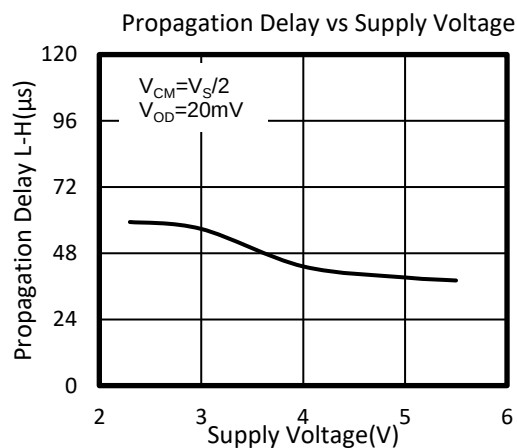
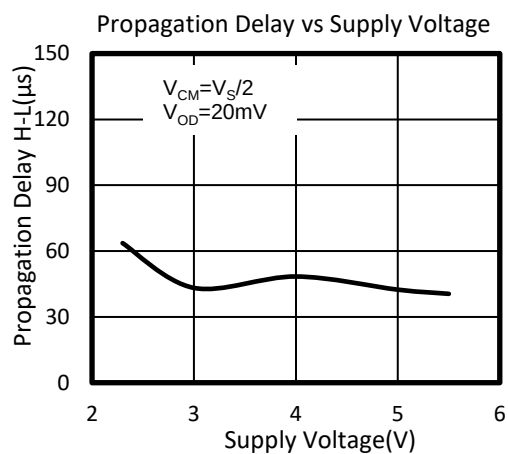
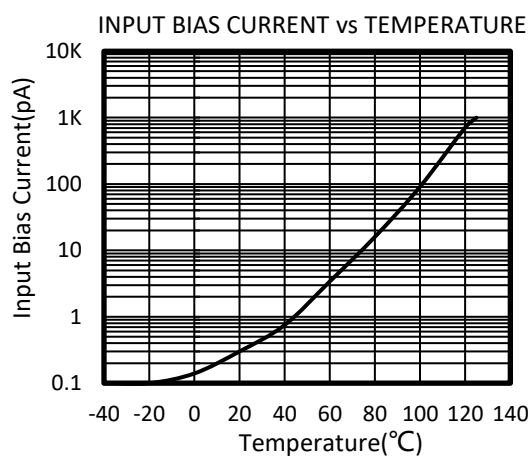
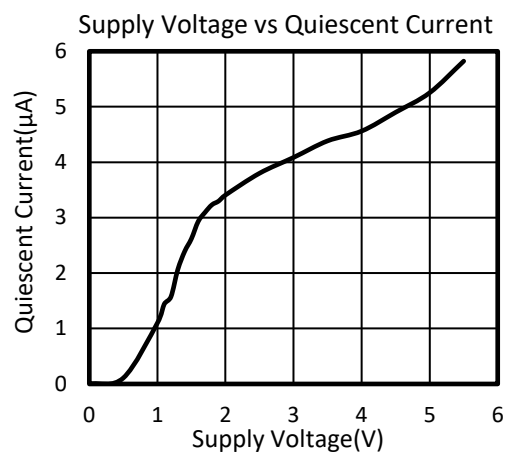
ELECTRICAL CHARACTERISTICS: $V_S=5V$

(At $T_A = +25^\circ\text{C}$, $V_+=5V$, $V_-=0V$, $V_{CM}=V_S/2$, unless otherwise noted.)

PARAMETER		CONDITIONS	RS8912			
			MIN	TYP	MAX	UINTS
POWER SUPPLY						
Vs	Operating Voltage Range		2.3		5.5	V
Iq	Quiescent Current			4.85	10	μA
PSRR	Power-Supply Rejection Ratio	Vs=2.3V to 5.5V, VCM=(V)+0.5V		70		dB
INPUT						
Vos	Input Offset Voltage	VCM =0V		1	3.5	mV
		VCM =5V		1	3.5	
ΔVos/ΔT	Input Offset Voltage Drift	VCM =Vs/2, -40°C ≤ TA ≤85°C		2		μV/°C
IB	Input Bias Current			1	10	pA
VCM	Common-Mode Voltage Range	TA = −40°C to 85°C	(V-)-0.1		(V+)+0.1	V
CMRR	Common-Mode Rejection Ratio	VCM =0V to 5V		70		dB
OUTPUT						
VOH	Output Swing From Upper Rail	Io=25uA	4.915	4.935		V
		Io=95uA	4.720	4.785		
VOL	Output Swing From Lower Rail	Io=25uA		55	72	mV
		Io=95uA		215	280	
ISC	Short Circuit Sink Current	Vs=5V		-2.25	-2.2	mA
	Short Circuit Source Current	Vs=5V	2.15	2.23		mA
SWITCHING						
TPHL	Propagation Delay H To L	Overdrive = 10 mV		67		μs
		Overdrive = 100 mV		12		
TPLH	Propagation Delay L To H	Overdrive = 10 mV		68		
		Overdrive = 100 mV		12		
TR	Rise Time	Overdrive = 100 mV		12		us
TF	Fall Time	Overdrive = 100 mV		12		us
	Noise of VREF	f=0.1Hz to 10Hz		20		uVRMS
VOLTAGE REFERENCE						
VREF	Reference Voltage	IREF=0mA	1.176	1.200	1.224	V
	Reference Voltage Drift			42		μV/°C
	Reference Output Current (Source)		200	350		uA

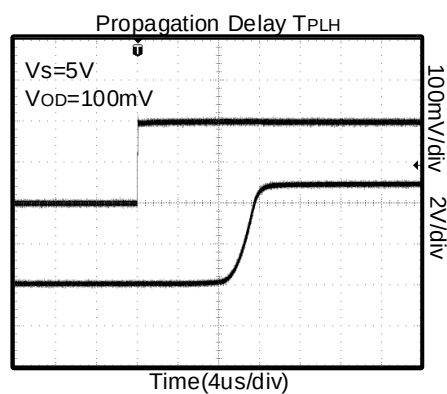
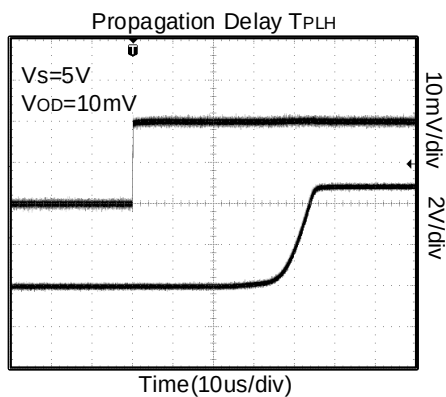
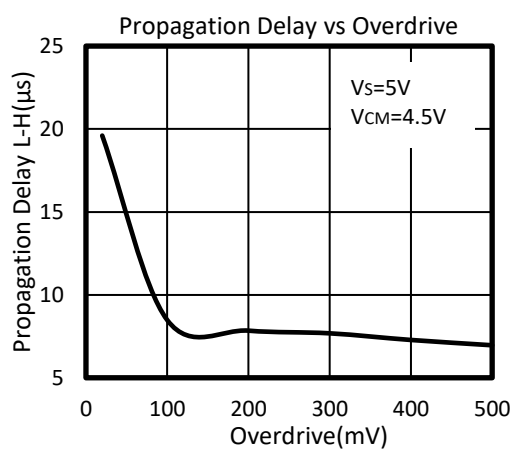
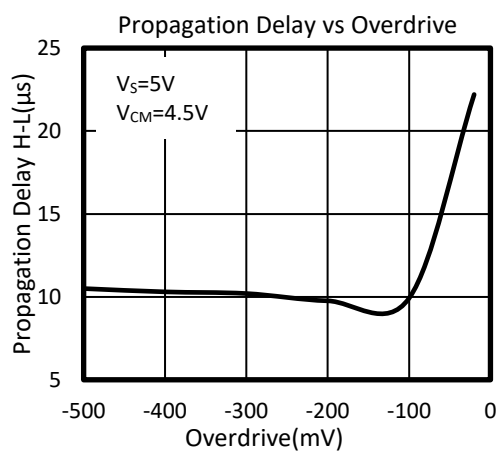
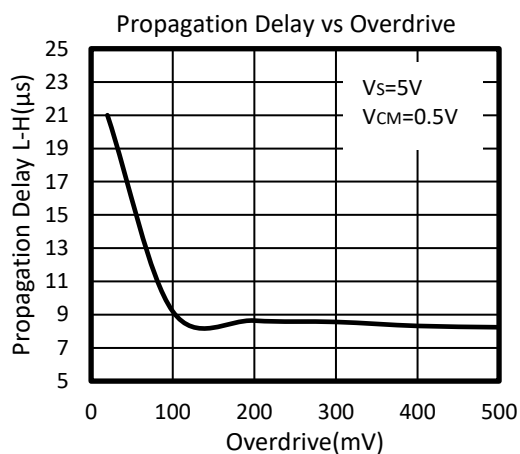
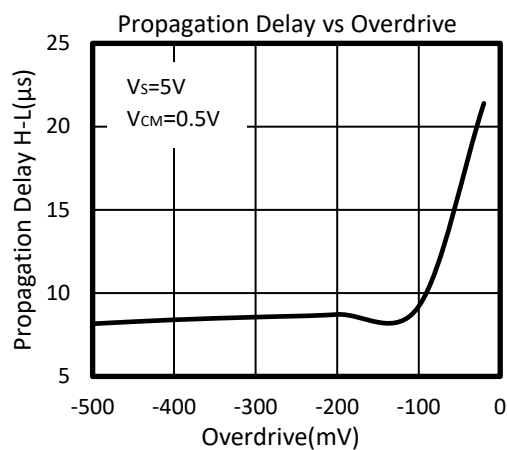
TYPICAL CHARACTERISTICS

At $T_A = +25^\circ\text{C}$, $V_S = 5\text{V}$, $V_{CM} = V_S/2$, $C_L = 15\text{pF}$ unless otherwise noted.



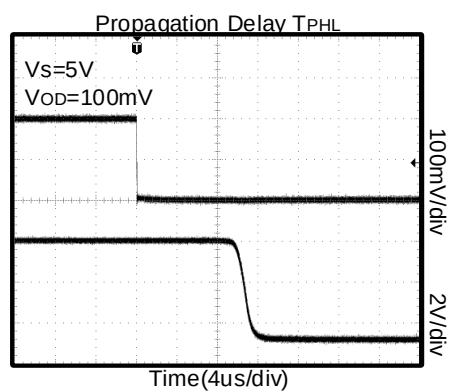
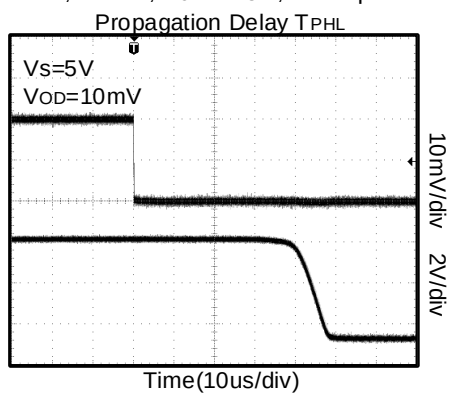
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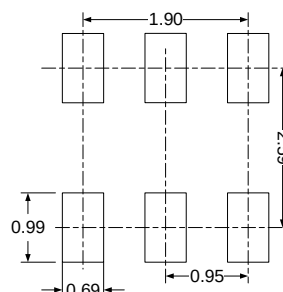
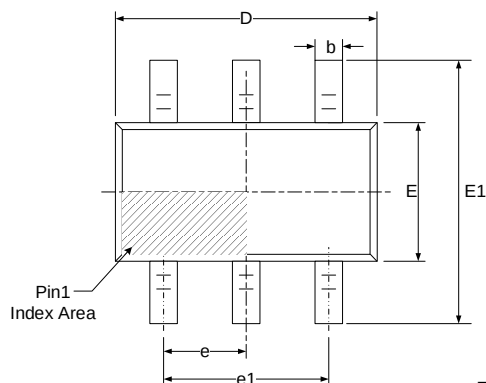


TYPICAL CHARACTERISTICS

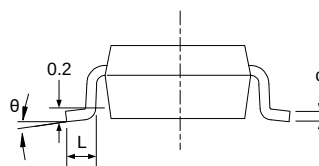
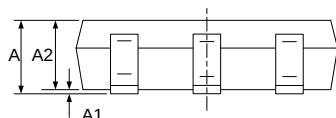
At $T_A = +25^{\circ}\text{C}$, $V_S = 5\text{V}$, $V_{CM} = V_S/2$, $C_L = 15\text{pF}$ unless otherwise noted.



PACKAGE OUTLINE DIMENSIONS SOT23-6

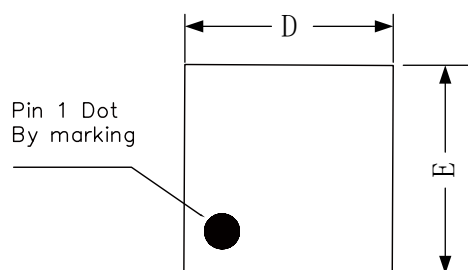


RECOMMENDED LAND PATTERN (Unit: mm)

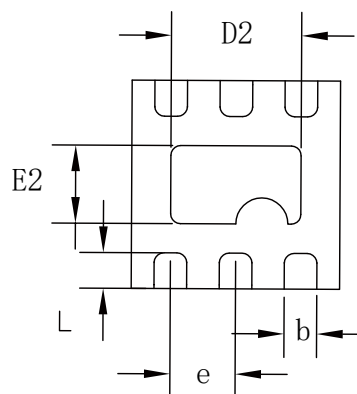


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

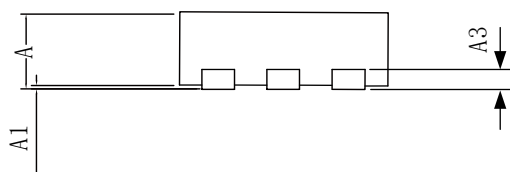
DFN1.6x1.6-6L



TOP VIEW



BOTTOM VIEW



SIDE VIEW

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.500	0.600	0.020	0.024
A1	0.000	0.050	0.000	0.002
A3	0.150 REF		0.006 REF	
D	1.550	1.650	0.061	0.065
E	1.550	1.650	0.061	0.065
D2	0.900	1.050	0.035	0.041
E2	0.500	0.650	0.020	0.025
L	0.200	0.300	0.008	0.012
b	0.200	0.300	0.008	0.012
e	0.500 BSC		0.020 BSC	