

- SIL4 / DIL8 Package
- Input Range $\pm 10\%$
- Efficiency up to 87 %
- Low Ripple and Noise
- Isolation 1000 VDC, up to 3000 VDC
- Operation Temperature Range -40 ~ 85 °C max.
- Non Conductive Black Plastic Case

RoHS



Picture similar

Number Structure

RS1	-	05	05	S	15	A	1
Series / Package		Input Voltage	Output Voltage	Output Type	Power	Int. Code	Isolation Voltage
RS1 = SIL4		05 = 5.0 Vdc	03 = 3.3 Vdc	S = Single Output	15 = 1.5 W	Logistics Code	1 = 1000 Vdc 3 = 3000 Vdc
RD1 = DIL8		12 = 12 Vdc	05 = 5.0 Vdc				
		24 = 24 Vdc	07 = 7.2 Vdc				
			09 = 9.0 Vdc				
			12 = 12 Vdc				
			15 = 15 Vdc				
			18 = 18 Vdc				
			24 = 24 Vdc				

Model Selection Guide							
Model Number	Input Voltage Range (VDC)	Input Current		Output Voltage (VDC)	Output Current Full Load (mA)	Efficiency @ FL (%, typ.)	Capacitive Load @ FL (μF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)				
RS1-0503S15AX	4.5 ~ 5.5	30	297	3.3	363.6	81	220
RS1-0505S15AX	4.5 ~ 5.5	35	380	5	300	79	220
RS1-0507S15AX	4.5 ~ 5.5	35	362	7.2	208	83	220
RS1-0509S15AX	4.5 ~ 5.5	25	395	9	166	76	220
RS1-0512S15AX	4.5 ~ 5.5	25	385	12	125	78	220
RS1-0515S15AX	4.5 ~ 5.5	42	371	15	100	81	220
RS1-0518S15AX	4.5 ~ 5.5	30	353	18	83	85	220
RS1-0524S15AX	4.5 ~ 5.5	35	353	24	62.5	85	220
RS1-1203S15AX	10.8 ~ 13.2	15	134	3.3	363.6	75	220
RS1-1205S15AX	10.8 ~ 13.2	25	159	5	300	79	220
RS1-1207S15AX	10.8 ~ 13.2	25	167	7.2	208	75	220
RS1-1209S15AX	10.8 ~ 13.2	20	151	9	166	83	220
RS1-1212S15AX	10.8 ~ 13.2	15	153	12	125	82	220
RS1-1215S15AX	10.8 ~ 13.2	15	157	15	100	80	220
RS1-1218S15AX	10.8 ~ 13.2	15	157	18	83	80	220
RS1-1224S15AX	10.8 ~ 13.2	30	149	24	62.5	84	220
RS1-2403S15AX	21.6 ~ 26.4	15	67	3.3	363.6	75	220
RS1-2405S15AX	21.6 ~ 26.4	10	76	5	300	83	220
RS1-2407S15AX	21.6 ~ 26.4	10	79	7.2	208	80	220
RS1-2409S15AX	21.6 ~ 26.4	12	75	9	167	84	220
RS1-2412S15AX	21.6 ~ 26.4	15	75	12	125	84	220
RS1-2415S15AX	21.6 ~ 26.4	10	76	15	100	83	220
RS1-2418S15AX	21.6 ~ 26.4	15	72	18	83	87	220
RS1-2424S15AX	21.6 ~ 26.4	8	72	24	62.5	87	220
RD1-0503S15AX	4.5 ~ 5.5	35	312	3.3	363.6	77	220
RD1-0505S15AX	4.5 ~ 5.5	35	385	5	300	78	220
RD1-0507S15AX	4.5 ~ 5.5	40	366	7.2	208	82	220
RD1-0509S15AX	4.5 ~ 5.5	30	358	9	167	84	220
RD1-0512S15AX	4.5 ~ 5.5	33	385	12	125	78	220
RD1-0515S15AX	4.5 ~ 5.5	35	380	15	100	79	220
RD1-0518S15AX	4.5 ~ 5.5	25	375	18	83	80	220
RD1-0524S15AX	4.5 ~ 5.5	30	362	24	62.5	83	220
RD1-1203S15AX	10.8 ~ 13.2	15	136	3.3	363.6	74	220
RD1-1205S15AX	10.8 ~ 13.2	15	153	5	300	82	220
RD1-1207S15AX	10.8 ~ 13.2	25	165	7.2	208	76	220
RD1-1209S15AX	10.8 ~ 13.2	15	148	9	167	85	220
RD1-1212S15AX	10.8 ~ 13.2	15	157	12	125	80	220
RD1-1215S15AX	10.8 ~ 13.2	15	157	15	100	80	220
RD1-1218S15AX	10.8 ~ 13.2	15	157	18	83	80	220
RD1-1224S15AX	10.8 ~ 13.2	15	165	24	62.5	76	220
RD1-2403S15AX	21.6 ~ 26.4	10	67	3.3	363.6	75	220
RD1-2405S15AX	21.6 ~ 26.4	9	77	5	300	82	220
RD1-2407S15AX	21.6 ~ 26.4	10	75	7.2	208	84	220
RD1-2409S15AX	21.6 ~ 26.4	10	74	9	167	85	220
RD1-2412S15AX	21.6 ~ 26.4	10	79	12	125	80	220
RD1-2415S15AX	21.6 ~ 26.4	8	76	15	100	83	220
RD1-2418S15AX	21.6 ~ 26.4	10	74	18	83	85	220
RD1-2424S15AX	21.6 ~ 26.4	9	76	24	62.5	83	220

ALL SPECIFICATIONS ARE TYPICAL AT 25 °C, NOMINAL INPUT AND FULL LOAD UNLESS OTHERWISE NOTED.

Input Specifications					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	5.0 Vdc Input	4.5	5.0	5.5	VDC
	12 Vdc Input	10.8	12	13.2	
	24 Vdc Input	21.6	24	26.4	
Input Current (No Load)		See Table			mA
Input Current (Full Load)		See Table			mA
Input Filter		Capacitor			-
Input Reflected Ripple Current ⁽¹⁾			20		mApk-pk
Start up Time	Nominal Vin and constant resistive load		20		ms
Recommended input fuse (slow blow)	5.0 Vdc Input		0.63		A
	12 Vdc Input		0.25		
	24 Vdc Input		0.125		
Note : 1. Measured with a simulated source inductance of 12 μH and a source capacitor Cin (47 μF, ESR < 1 Ω at 100 kHz).					

Output Specifications					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		-3		+3	%
Line Regulation	For 1 % Vin Change	-1.2		+1.2	%
Load Regulation	From 20 % to 100 % Load	RD1-0505S15AX RS1-0505S15AX RS1-0512S15AX		12	%
		All other Output		8	
Ripple & Noise	20 MHz Bandwidth			100	mVpk-pk
Short Circuit Protection		Short Term (1 sec.)			
Temperature Coefficient		-0.02		+0.02	%/°C
Maximum Capacitive Load	Minimum Vin and constant resistive load	See Table			

Absolute Maximum Ratings					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (100 ms)	5.0 Vdc Input			7	VDC
	12 Vdc Input			15	
	24 Vdc Input			28	
Soldering Temperature	1.5 mm from case 10 sec. max.			260	°C
Note : These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.					

General Specifications						
Parameter	Conditions		Min.	Typ.	Max.	Unit
Efficiency			See Table			%
Isolation Voltage	Input-output, and rated for 60 sec.	Suffix "1"	1000			VDC
		Suffix "3"	3000			
Isolation Resistance	Input-output		1000			MΩ
Isolation Capacitance	Input-output			60		pF
Switching Frequency				80		kHz
Reliability Calculated MTBF	MIL-HDBK-217 F @ 25 °C		1121			k hours
Safety Standard	IEC / EN / UL 62368-1		Designed to meet			
Environmental compliance	RoHS		Designed to meet			

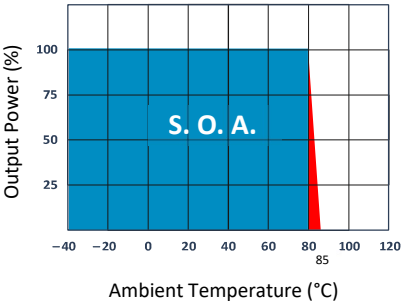
Environmental Specifications						
Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating Ambient Temperature	See the Derating Curve		-40		85	°C
Maximum Case Temperature					100	°C
Thermal Impedance	SIL		70			°C/W
	DIL		55			
Storage Humidity					95	% rel. H
Storage Temperature			-55		125	°C
Cooling	Natural Convection		30 - 65 LFM			

Physical Specifications		
Parameter	Value	
Case Material	Nonconductive Black Plastic (UL94V-0 rated)	
Pin Material	SIL	Alloy 42
	DIL	Ø0.5mm Brass Solder-coated
Potting Material	Epoxy (UL94V-0 rated)	
Weight ⁽¹⁾	SIL	1.5 g / 1.9 g, typ.
	DIL	1.8 g, typ.
Dimensions ⁽¹⁾	SIL	0.46" x 0.24" x 0.40" / 0.46" x 0.29" x 0.40"
	DIL	0.50" x 0.40" x 0.27"
Note : 1. The thickness of the following models is 0.24" (6.0mm) RS1-0505S15A1, RS1-0509S15A1, RS1-0512S15A1, RS1-0515S15A1, RS1-1212S15A1, RS1-1212S15A3, RS1-2409S15A1, RS1-2415S15A1		

Thermal Derating

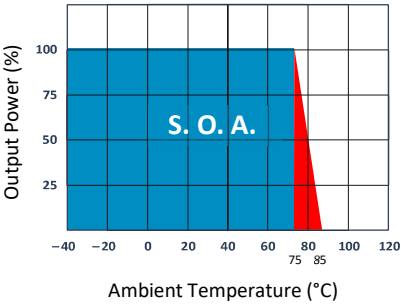
To enhance the system reliability, the power module should always be operated below the maximum operating temperature. If the temperature exceeds the maximum operating temperature, reliability of the unit may be affected.

Temperature Derating Curve



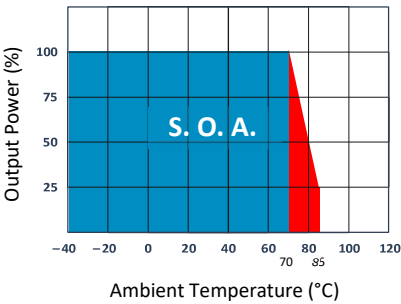
RS1-0503S15AX Model

Temperature Derating Curve



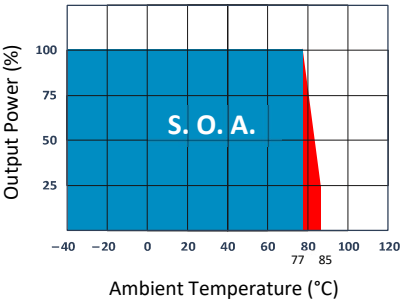
RS1-1203S15AX & RS1-2403S15AX Models

Temperature Derating Curve



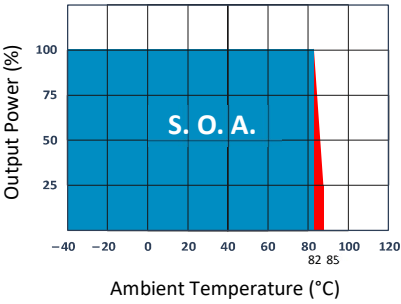
RS1-1207S15AX Model

Temperature Derating Curve



5 Vdc, 7.2 Vdc, 9 Vdc Output & 79 % ~ 80 % Models

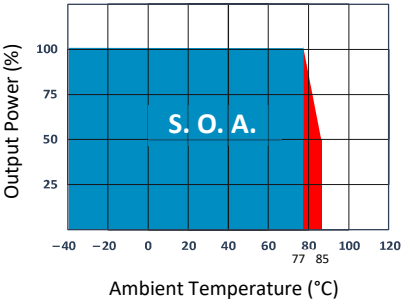
Temperature Derating Curve



5 Vdc, 7.2 Vdc, 9 Vdc Output & 83 % Models

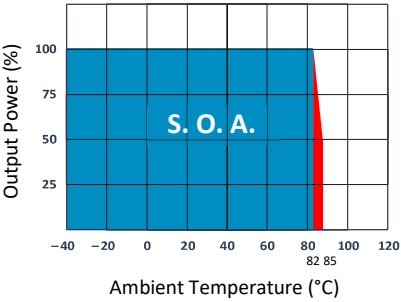
Thermal Derating

Temperature Derating Curve



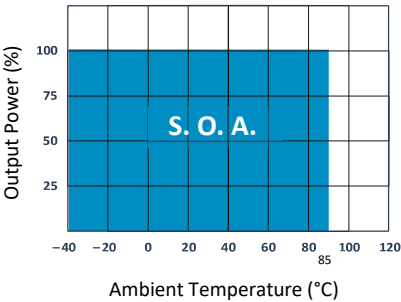
12 Vdc, 24 Vdc Output & 80 % Models

Temperature Derating Curve



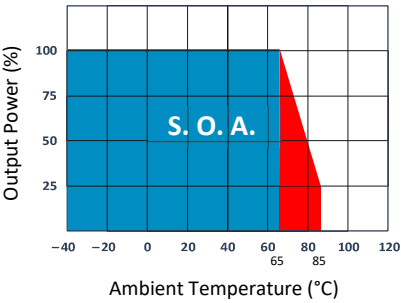
12 Vdc, 24 Vdc Output & 84 % Models

Temperature Derating Curve



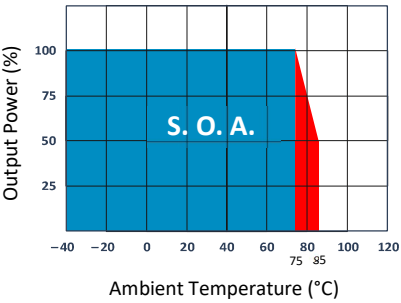
12 Vdc, 24 Vdc Output & 87 % Models

Temperature Derating Curve



Thickness 6.0 mm & 76 % ~ 79 % Models

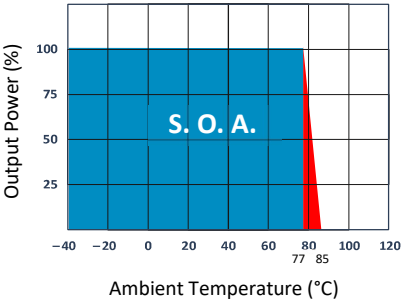
Temperature Derating Curve



Thickness 6.0 mm & 81 % ~ 84 % Models

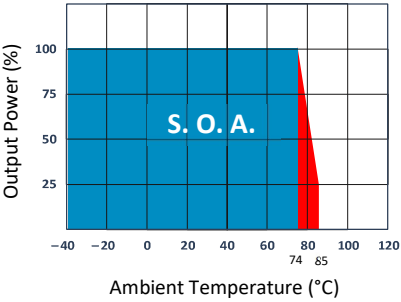
Thermal Derating

Temperature Derating Curve



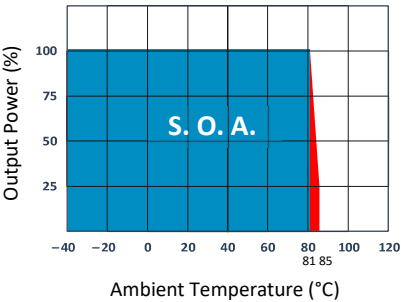
3.3 Vdc Output Models

Temperature Derating Curve



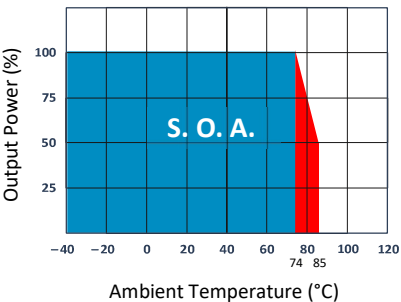
5 Vdc, 7.2 Vdc, 9 Vdc Output & 76 % ~ 78 % Models

Temperature Derating Curve



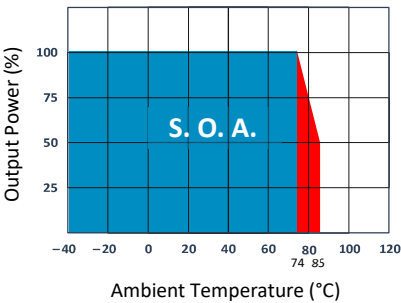
5 Vdc, 7.2 Vdc, 9 Vdc Output & 82 % ~ 85 % Models

Temperature Derating Curve



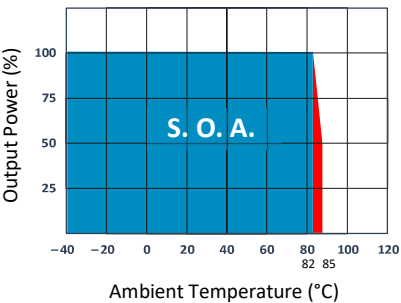
12 Vdc, 24 Vdc Output & 76 % ~ 79 % Models

Temperature Derating Curve



12 Vdc, 24 Vdc Output & 80 % ~ 83 % Models

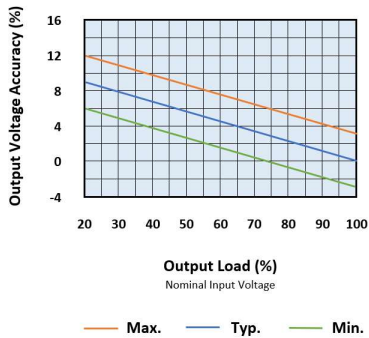
Temperature Derating Curve



12 Vdc, 24 Vdc Output & 84 % Models

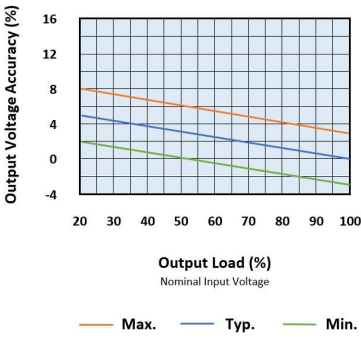
Output Voltage Tolerance Envelope Curve

Output Voltage Tolerance Envelope Curve



RD1-0505S15AX, RS1-0505S15AX
RS1-0512S15AX

Output Voltage Tolerance Envelope Curve

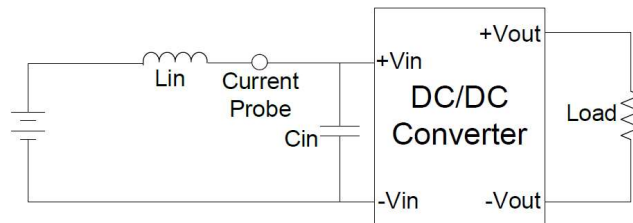


Other Models

Test Configurations

Input Reflected Ripple Current Test Step

Input reflected ripple current is measured with a source inductor L_{in} (12 μ H) and a source capacitor C_{in} (47 μ F, ESR < 1.0 Ω at 100 kHz) at nominal input and full load.



Design & Feature Configurations

Isolation Voltage

This series is designed to meet the functional insulation of UL, both input and output should be maintained within SELV limits (less than 42.4 V peak, or 60 Vdc).

The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with hundreds of volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

Repeated High-Voltage Isolation Testing

Repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. This series has isolation transformers without additional insulation between primary and secondary windings of enameled wire.

While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation.

Any material including the enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltage, thus implying that the number of tests should be strictly limited.

We strongly advise against repeated high voltage isolation testing, but if it is absolutely required, the isolation test voltage should be reduced by 20 % from specified test voltage.

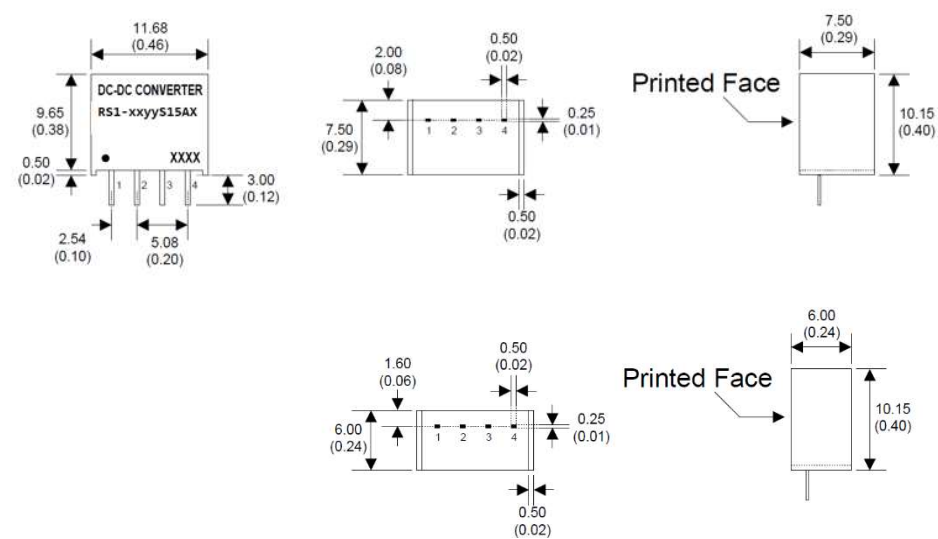
Pin Connections

SIL4 Package	
PIN NUMBER	DUAL
1	-Vin
2	+Vin
3	-Vout
4	+Vout

DIL8 Package	
PIN NUMBER	DUAL
1	-Vin
4	+Vin
5	+Vout
7	-Vout

Mechanical Specifications

SIL 4 Package

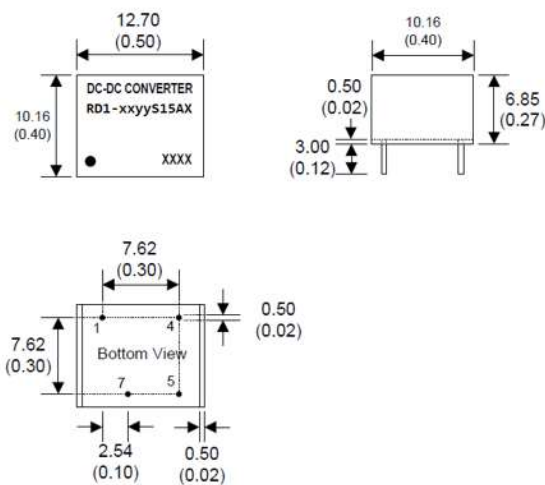


The thickness of the following models is 0.24" (6.0mm)			
RS1-0505S15A1	RS1-0509S15A1	RS1-0512S15A1	RS1-0515S15A1
RS1-1212S15A1	RS1-1212S15A3	RS1-2409S15A1	RS1-2415S15A1

- Notes :
- All dimensions are typical in millimeters (inches).
 - 1. Pin dimension tolerance: ± 0.05 (± 0.002)
 - 2. Pin pitch and length tolerance: ± 0.35 (± 0.014)
 - 3. Pin to case tolerance: ± 0.5 (± 0.02)
 - 4. Case Tolerance: ± 0.5 (± 0.02)

Mechanical Specifications

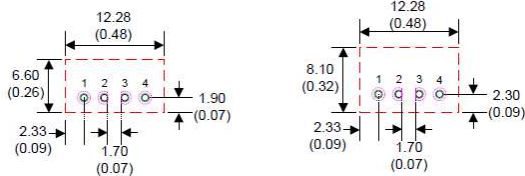
DIL 8 Package



- Notes : All dimensions are typical in millimeters (inches).
- 1. Pin dimension tolerance: ± 0.05 (± 0.002)
 - 2. Pin pitch and length tolerance: ± 0.35 (± 0.014)
 - 3. Pin to case tolerance: ± 0.5 (± 0.02)
 - 4. Case Tolerance: ± 0.5 (± 0.02)

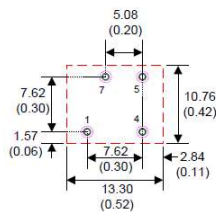
Recommended Footprint Details

SIL 4 Package



- SIL Notes : All dimensions are typical in millimeters (inches).
- 1. Through hole (black): $\varnothing 0.80$ (0.031)
 - 2. Top view pad (green) $\varnothing 1.00$ (0.039)
 - 3. Bottom view pad (pink): $\varnothing 1.60$ (0.063)

DIL 8 Package



- DIL Notes : All dimensions are typical in millimeters (inches).
- 1. Through hole (black): $\varnothing 0.80$ (0.031)
 - 2. Top view pad (green): $\varnothing 1.00$ (0.039)
 - 3. Bottom view pad (pink): $\varnothing 1.60$ (0.063)

Notes

The information and specification contained in this data sheet are believed to be correct at time of publication. However, Acal BFi accepts no responsibility for consequences arising from printing errors or inaccuracies. Specifications are subject to change without notice.