

- SIL7 / DIL14 Package
- Input Range $\pm 10\%$
- Efficiency up to 85 %
- Low Ripple and Noise
- Isolation 1000 VDC, up to 3000 VDC
- Operation Temperature Range -40 ~ 100 °C max.
- Non Conductive Black Plastic Case

RoHS



Picture similar

Number Structure						
RS3	-	05	05	E	20	A 1
Series / Package	Input Voltage	Output Voltage	Output Type	Power	Int. Code	Isolation Voltage
RS3 = SIL7	05 = 5.0 Vdc	03 = 3.3 Vdc	E = Dual Separate	20 = 2 W	Logistics Code	1 = 1000 Vdc
RD3 = DIL14	12 = 12 Vdc	05 = 5.0 Vdc	T = Dual Split			3 = 3000 Vdc
	24 = 24 Vdc	07 = 7.2 Vdc	(+15 /-9 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.)				
RS3-0503E20AX	4.5-5.5	50	519	3.3 , 3.3	303 , 303	77	220
RS3-0505E20AX	4.5-5.5	40	494	5 , 5	200 , 200	81	220
RS3-0507E20AX	4.5-5.5	25	476	7.2 , 7.2	139 , 139	84	220
RS3-0509E20AX	4.5-5.5	32	506	9 , 9	111 , 111	79	220
RS3-0512E20AX	4.5-5.5	35	494	12 , 12	83 , 83	81	220
RS3-0515E20AX	4.5-5.5	46	494	15 , 15	67 , 67	81	220
RS3-0518E20AX	4.5-5.5	43	494	18 , 18	55 , 55	81	220
RS3-0524E20AX	4.5-5.5	55	500	24 , 24	41 , 41	80	220
RS3-1203E20AX	10.8-13.2	25	208	3.3 , 3.3	303 , 303	80	220
RS3-1205E20AX	10.8-13.2	25	206	5 , 5	200 , 200	81	220
RS3-1207E20AX	10.8-13.2	18	219	7.2 , 7.2	139 , 139	76	220
RS3-1209E20AX	10.8-13.2	25	211	9 , 9	111 , 111	79	220
RS3-1212E20AX	10.8-13.2	20	203	12 , 12	83 , 83	82	220
RS3-1215E20AX	10.8-13.2	18	201	15 , 15	67 , 67	83	220
RS3-1218E20AX	10.8-13.2	25	203	18 , 18	55 , 55	82	220
RS3-1224E20AX	10.8-13.2	25	203	24 , 24	41 , 41	82	220
RS3-2403E20AX	21.6-26.4	12	102	3.3 , 3.3	303 , 303	82	220
RS3-2405E20AX	21.6-26.4	10	102	5 , 5	200 , 200	82	220
RS3-2407E20AX	21.6-26.4	13	108	7.2 , 7.2	139 , 139	77	220
RS3-2409E20AX	21.6-26.4	15	107	9 , 9	111 , 111	78	220
RS3-2412E20AX	21.6-26.4	15	105	12 , 12	83 , 83	79	220
RS3-2415E20AX	21.6-26.4	20	104	15 , 15	67 , 67	80	220
RS3-2418E20AX	21.6-26.4	13	102	18 , 18	55 , 55	82	220
RS3-2424E20AX	21.6-26.4	15	102	24 , 24	41 , 41	82	220
RS3-0503T20AX	4.5-5.5	35	500	5 , 3.3	200 , 303	80	220
RS3-0507T20AX	4.5-5.5	35	500	5 , 7.2	200 , 139	80	220
RS3-0509T20AX	4.5-5.5	30	494	5 , 9	200 , 111	81	220
RS3-0512T20AX	4.5-5.5	35	488	5 , 12	200 , 83	82	220
RS3-0515T20AX	4.5-5.5	40	500	5 , 15	200 , 67	80	220
RS3-0518T20AX	4.5-5.5	35	500	5 , 18	200 , 55	80	220
RS3-0524T20AX	4.5-5.5	35	500	5 , 24	200 , 41	80	220
RS3-1203T20AX	10.8-13.2	20	208	5 , 3.3	200 , 303	80	220
RS3-1207T20AX	10.8-13.2	20	201	5 , 7.2	200 , 139	83	220
RS3-1209T20AX	10.8-13.2	25	208	5 , 9	200 , 111	80	220
RS3-1212T20AX	10.8-13.2	25	208	5 , 12	200 , 83	80	220
RS3-1215T20AX	10.8-13.2	25	208	5 , 15	200 , 67	80	220
RS3-1218T20AX	10.8-13.2	25	208	5 , 18	200 , 55	80	220
RS3-1224T20AX	10.8-13.2	25	208	5 , 24	200 , 41	80	220
RS3-2403T20AX	21.6-26.4	12	103	5 , 3.3	200 , 303	81	220
RS3-2407T20AX	21.6-26.4	12	104	5 , 7.2	200 , 139	80	220
RS3-2409T20AX	21.6-26.4	12	104	5 , 9	200 , 111	80	220
RS3-2412T20AX	21.6-26.4	15	107	5 , 12	200 , 83	78	220
RS3-2415T20AX	21.6-26.4	12	100	5 , 15	200 , 67	83	220
RS3-2418T20AX	21.6-26.4	12	104	5 , 18	200 , 55	80	220
RS3-2424T20AX	21.6-26.4	15	103	5 , 24	200 , 41	81	220

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.)				
RD3-0503T20AX	4.5-5.5	50	519	3.3 , 3.3	303 , 303	77	220
RD3-0505T20AX	4.5-5.5	32	494	5 , 5	200 , 200	81	220
RD3-0507T20AX	4.5-5.5	35	494	7.2 , 7.2	139 , 139	81	220
RD3-0509T20AX	4.5-5.5	35	494	9 , 9	111 , 111	81	220
RD3-0512T20AX	4.5-5.5	35	488	12 , 12	83 , 83	82	220
RD3-0515T20AX	4.5-5.5	35	500	15 , 15	67 , 67	80	220
RD3-0518T20AX	4.5-5.5	35	500	18 , 18	55 , 55	80	220
RD3-0524T20AX	4.5-5.5	35	500	24 , 24	41 , 41	80	220
RD3-1203T20AX	10.8-13.2	25	208	3.3 , 3.3	303 , 303	80	220
RD3-1205T20AX	10.8-13.2	25	208	5 , 5	200 , 200	80	220
RD3-1207T20AX	10.8-13.2	25	208	7.2 , 7.2	139 , 139	80	220
RD3-1209T20AX	10.8-13.2	25	198	9 , 9	111 , 111	84	220
RD3-1212T20AX	10.8-13.2	20	206	12 , 12	83 , 83	81	220
RD3-1215T20AX	10.8-13.2	25	206	15 , 15	67 , 67	81	220
RD3-1218T20AX	10.8-13.2	25	206	18 , 18	55 , 55	81	220
RD3-1224T20AX	10.8-13.2	25	206	24 , 24	41 , 41	81	220
RD3-2403T20AX	21.6-26.4	12	103	3.3 , 3.3	303 , 303	81	220
RD3-2405T20AX	21.6-26.4	8	100	5 , 5	200 , 200	83	220
RD3-2407T20AX	21.6-26.4	15	103	7.2 , 7.2	139 , 139	81	220
RD3-2409T20AX	21.6-26.4	15	103	9 , 9	111 , 111	81	220
RD3-2412T20AX	21.6-26.4	15	103	12 , 12	83 , 83	81	220
RD3-2415T20AX	21.6-26.4	10	98	15 , 15	67 , 67	85	220
RD3-2418T20AX	21.6-26.4	15	103	18 , 18	55 , 55	81	220
RD3-2424T20AX	21.6-26.4	17	104	24 , 24	41 , 41	80	220
RD3-0503T20AX	4.5-5.5	35	500	5 , 3.3	200 , 303	80	220
RD3-0507T20AX	4.5-5.5	30	482	5 , 7.2	200 , 139	83	220
RD3-0509T20AX	4.5-5.5	35	500	5 , 9	200 , 111	80	220
RD3-0512T20AX	4.5-5.5	35	500	5 , 12	200 , 83	80	220
RD3-0515T20AX	4.5-5.5	35	500	5 , 15	200 , 67	80	220
RD3-0518T20AX	4.5-5.5	35	500	5 , 18	200 , 55	80	220
RD3-0524T20AX	4.5-5.5	35	500	5 , 24	200 , 41	80	220
RD3-1203T20AX	10.8-13.2	25	208	5 , 3.3	200 , 303	80	220
RD3-1207T20AX	10.8-13.2	25	208	5 , 7.2	200 , 139	80	220
RD3-1209T20AX	10.8-13.2	25	208	5 , 9	200 , 111	80	220
RD3-1212T20AX	10.8-13.2	25	208	5 , 12	200 , 83	80	220
RD3-1215T20AX	10.8-13.2	25	208	5 , 15	200 , 67	80	220
RD3-1218T20AX	10.8-13.2	25	208	5 , 18	200 , 55	80	220
RD3-1224T20AX	10.8-13.2	20	216	5 , 24	200 , 41	77	220
RD3-2403T20AX	21.6-26.4	12	104	5 , 3.3	200 , 303	80	220
RD3-2407T20AX	21.6-26.4	12	104	5 , 7.2	200 , 139	80	220
RD3-2409T20AX	21.6-26.4	12	104	5 , 9	200 , 111	80	220
RD3-2412T20AX	21.6-26.4	12	104	5 , 12	200 , 83	80	220
RD3-2415T20AX	21.6-26.4	10	104	5 , 15	200 , 67	80	220
RD3-2418T20AX	21.6-26.4	12	104	5 , 18	200 , 55	80	220
RD3-2424T20AX	21.6-26.4	10	99	5 , 24	200 , 41	84	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		
Recommended input fuse (slow blow)	5.0 Vdc Input		1.25		A
	12 Vdc Input		0.5		
	24 Vdc Input		0.25		
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	3.3 Vdc Output			+20	%
	From 20 % to 100 % Load			+10	
Ripple & Noise ⁽¹⁾	20 MHz Bandwidth			75	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			
	Output1-output2, and rated for 60 sec.		1000			
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			

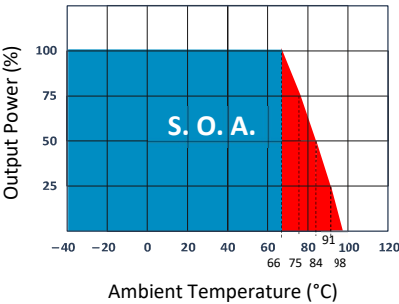
Environmental Specifications					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating Ambient Temperature	See the Derating Curve	-40		100	°C
Maximum Case Temperature				100	°C
Thermal Impedance		52.68			°C/W
Storage Humidity				95	% rel. H
Storage Temperature		-55		125	°C
Cooling	Natural Convection	30 - 65 LFM			

Physical Specifications		
Parameter		Value
Case Material		Nonconductive Black Plastic (UL94V-0 rated)
Pin Material		Alloy 42
Potting Material		Epoxy (UL94V-0 rated)
Weight	SIL	2.3 g / 2.7 g, typ.
	DIL	2.7 g, typ.
Dimensions	SIL	0.76" x 0.24" x 0.39" / 0.76" x 0.28" x 0.39"
	DIL	0.80" x 0.40" x 0.27"

Thermal Derating

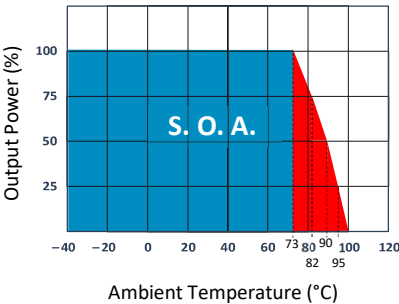
To enhance the system reliability, the power module should always be operated below the maximum operating temperature. If the temperature exceeds the maximum operating temperature, reliability of the unit may be affected.

Temperature Derating Curve



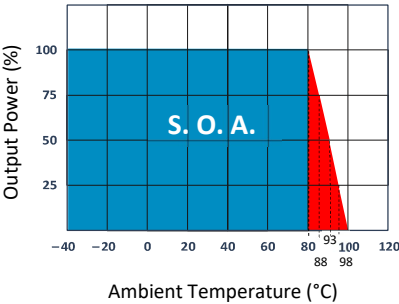
Efficiency : 76 % ~ 79 %

Temperature Derating Curve



Efficiency : 80 % ~ 84 %

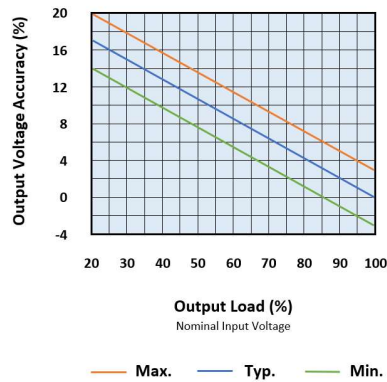
Temperature Derating Curve



Efficiency : 85 %

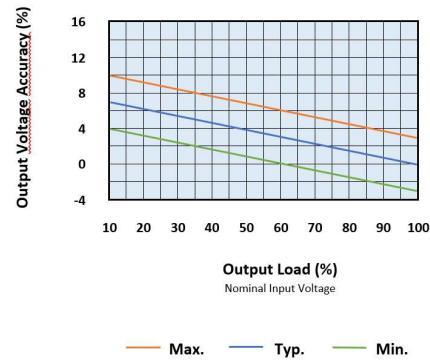
Output Voltage Tolerance Envelope Curve

Output Voltage Tolerance Envelope Curve



3.3 Vdc Output Models

Output Voltage Tolerance Envelope Curve

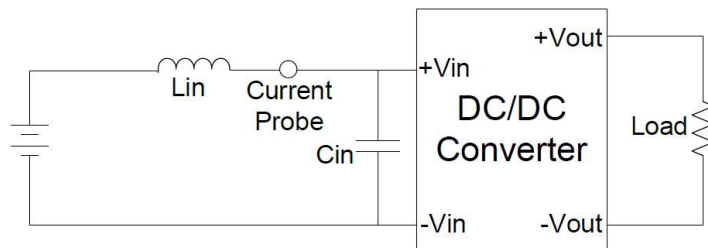


From 20% to 100% Load

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.

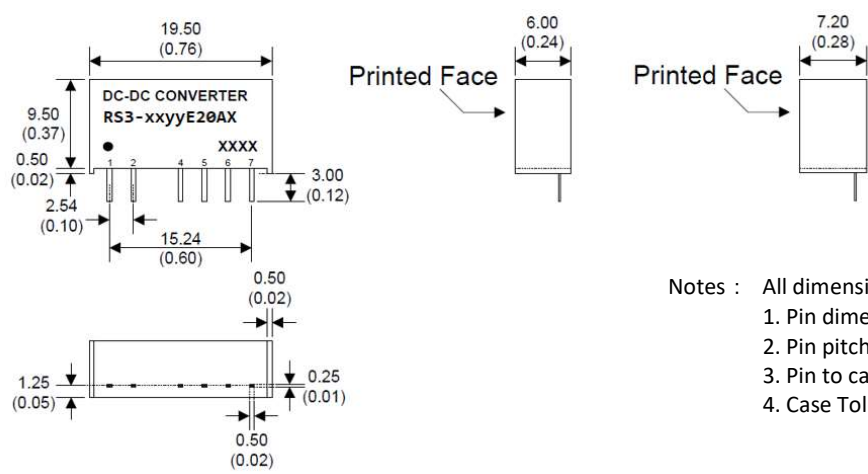
Pin Connections

PIN CONNECTIONS	
PIN NUMBER	SIL
1	+Vin
2	-Vin
4	+V1out
5	-V1out
6	+V2out
7	-V2out

PIN CONNECTIONS	
PIN NUMBER	DIL
1	-Vin
7	N.C.
8	-V2out
9	+V2out
10	-V1out
11	+V1out
14	+Vin
*N.C. : No Connection	

Mechanical Specifications

SIL Package



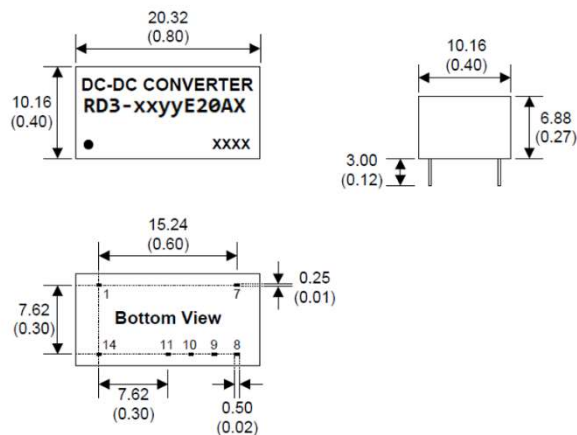
- Notes :
- All dimensions are typical in millimeters (inches).
 - 1. Pin dimension tolerance: ± 0.05 (± 0.002)
 - 2. Pin pitch and length tolerance: ± 0.35 (± 0.014)
 - 3. Pin to case tolerance: ± 0.5 (± 0.02)
 - 4. Case Tolerance: ± 0.5 (± 0.02)

The thickness of the following models is 6.0 mm

Vin	5 Vdc	12 Vdc		24 Vdc				
Suffix "1"	RS3-0515E20A1	RS3-1205E20A1	RS3-1212E20A1	RS3-2405E20A1	RS3-2407E20A1	RS3-2409E20A1	RS3-2412E20A1	RS3-2412T20A1
Suffix "3"	RS3-0515E20A3	RS3-1205E20A3	RS3-1212E20A3	RS3-2405E20A3	RS3-2407E20A3	RS3-2409E20A3	RS3-2412E20A3	RS3-2412T20A3

Mechanical Specifications

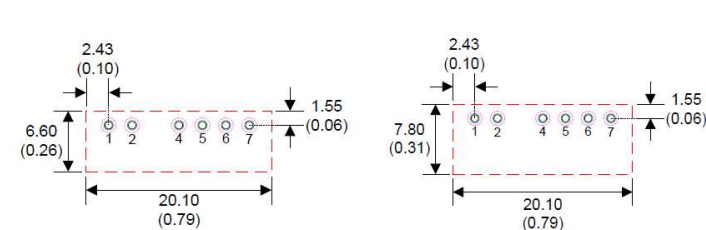
DIL Package



- 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)

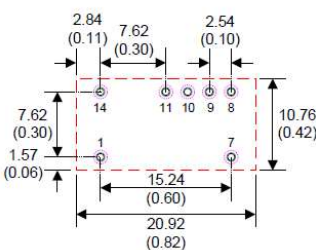
Recommended Footprint Details

SIL 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 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.