

- SIL7 Package
- Efficiency up to 86 %
- Continuous Short Circuit Protection
- Ultra High I/O Isolation 5000 VAC with Reinforced Insulation, rated for 300 Vrms Working Voltage
- CMTI 65 kV/μs at 1 kV Common Mode Voltage
- Low Coupling Capacitance
- Operation Temperature Range -40 ~ 95 °C max.
- Suitable for IGBT Applications
- Option for Input / Output Clearance > 9 mm with Alternative Pinout

RoHS



Picture similar

Number Structure

RS7	-	05	05	S	20	A	5	(P)
Series / Package	Input Voltage		Output Voltage	Output Type	Power	Int. Code	Isolation Voltage	Pinning
RS7 = SIL7	05 = 5.0 Vdc		03 = 3.3 Vdc	S = Single Output	20 = 2 W	Logistics Code	5 = 5000 Vac	P = Optional Special Pinning 2 mm Pin pitch
	12 = 12 Vdc		05 = 5.0 Vdc	D = Dual Output				
	15 = 15 Vdc		09 = 9.0 Vdc	T = Dual Split				
	24 = 24 Vdc		12 = 12 Vdc 15 = 15 Vdc	(+15 /-9 Vdc)				

v2 = 2nd Version

Model Selection Guide								
Model Number	Input Voltage Range (VDC)	Input Current		Output Voltage (VDC)	Output Current		Efficiency @ FL (% , typ.)	Capacitive Load @ FL (μF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)		Min. Load (mA)	Full Load (mA)		
RS7-0503S20A5v2	4.5 ~ 5.5	50	501.26	3.3	0	600	79	3300
RS7-0505S20A5v2	4.5 ~ 5.5	60	506.33	5	0	400	79	1200
RS7-0509S20A5v2	4.5 ~ 5.5	60	493.33	9	0	222	81	1200
RS7-0512S20A5v2	4.5 ~ 5.5	60	477.14	12	0	167	84	680
RS7-0515S20A5v2	4.5 ~ 5.5	60	480.72	15	0	133	83	680
RS7-1203S20A5v2	10.8 ~ 13.2	25	208.86	3.3	0	600	79	3300
RS7-1205S20A5v2	10.8 ~ 13.2	30	200.80	5	0	400	83	1200
RS7-1209S20A5v2	10.8 ~ 13.2	30	200.60	9	0	222	83	1200
RS7-1212S20A5v2	10.8 ~ 13.2	30	200.30	12	0	167	83	680
RS7-1215S20A5v2	10.8 ~ 13.2	30	200.30	15	0	133	83	680
RS7-1503S20A5v2	13.5 ~ 16.5	25	167.09	3.3	0	600	79	3300
RS7-1505S20A5v2	13.5 ~ 16.5	30	162.60	5	0	400	82	1200
RS7-1509S20A5v2	13.5 ~ 16.5	30	162.44	9	0	222	83	1200
RS7-1512S20A5v2	13.5 ~ 16.5	30	159.04	12	0	167	84	680
RS7-1515S20A5v2	13.5 ~ 16.5	30	160.24	15	0	133	83	680
RS7-2403S20A5v2	21.6 ~ 26.4	20	107.14	3.3	0	600	77	3300
RS7-2405S20A5v2	21.6 ~ 26.4	20	101.62	5	0	400	82	1200
RS7-2409S20A5v2	21.6 ~ 26.4	20	100.30	9	0	222	83	1200
RS7-2412S20A5v2	21.6 ~ 26.4	20	99.40	12	0	167	84	680
RS7-2415S20A5v2	21.6 ~ 26.4	20	100.15	15	0	133	83	680
RS7-0503D20A5v2	4.5 ~ 5.5	50	493.77	±3.3	0	±303	81	±1500
RS7-0505D20A5v2	4.5 ~ 5.5	60	493.82	±5	0	±200	81	±470
RS7-0509D20A5v2	4.5 ~ 5.5	60	481.44	±9	0	±111	83	±470
RS7-0512D20A5v2	4.5 ~ 5.5	60	480.00	±12	0	±83	83	±330
RS7-0515D20A5v2	4.5 ~ 5.5	60	490.24	±15	0	±67	82	±330
RS7-1203D20A5v2	10.8 ~ 13.2	25	203.23	±3.3	0	±303	82	±1500
RS7-1205D20A5v2	10.8 ~ 13.2	30	198.41	±5	0	±200	84	±470
RS7-1209D20A5v2	10.8 ~ 13.2	30	200.60	±9	0	±111	83	±470
RS7-1212D20A5v2	10.8 ~ 13.2	30	197.62	±12	0	±83	84	±330
RS7-1215D20A5v2	10.8 ~ 13.2	30	197.06	±15	0	±67	85	±330
RS7-1503D20A5v2	13.5 ~ 16.5	25	164.59	±3.3	0	±303	81	±1500
RS7-1505D20A5v2	13.5 ~ 16.5	30	160.64	±5	0	±200	83	±470
RS7-1509D20A5v2	13.5 ~ 16.5	30	158.57	±9	0	±111	84	±470
RS7-1512D20A5v2	13.5 ~ 16.5	30	154.41	±12	0	±83	86	±330
RS7-1515D20A5v2	13.5 ~ 16.5	30	155.81	±15	0	±67	86	±330
RS7-2403D20A5v2	21.6 ~ 26.4	20	104.15	±3.3	0	±303	80	±1500
RS7-2405D20A5v2	21.6 ~ 26.4	20	99.20	±5	0	±200	84	±470
RS7-2409D20A5v2	21.6 ~ 26.4	20	99.10	±9	0	±111	84	±470
RS7-2412D20A5v2	21.6 ~ 26.4	20	97.64	±12	0	±83	85	±330
RS7-2415D20A5v2	21.6 ~ 26.4	20	98.53	±15	0	±67	85	±330
RS7-051509T20A5v2	4.5 ~ 5.5	60	495.64	+15 / -9	0	+67 / -111	83	±330
RS7-121509T20A5v2	10.8 ~ 13.2	30	196.03	+15 / -9	0	+67 / -111	85	±330
RS7-151509T20A5v2	13.5 ~ 16.5	30	158.69	+15 / -9	0	+67 / -111	84	±330
RS7-241509T20A5v2	21.6 ~ 26.4	25	100.37	+15 / -9	0	+67 / -111	83	±330

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	
	15 Vdc Input	13.5	15	16.5	
	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		30		ms
Recommended input fuse (slow blow)	5.0 Vdc Input		1.0		A
	12 Vdc Input		0.4		
	15 Vdc Input		0.4		
	24 Vdc Input		0.2		
Note : 1. Measured with a simulated source inductance of 22 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 10 % to 100 % Load	3.3 V, 5 V Output			15	%
		Other Output			10	
	From 0 % to 100 % Load				35	
Cross Regulation	Asymmetrical Load 25 % / 100 % for Dual Output	3.3 V, 5 V Output	-8		+8	%
		Other Output	-5		+5	
Ripple & Noise ⁽¹⁾	20 MHz Bandwidth				150	mVpk-pk
Short Circuit Protection			Continuous (Automatic Recovery)			-
Temperature Coefficient			-0.03		+0.03	%/°C
Maximum Capacitive Load	Maxmum Vin and constant resistive load		See Table			-
Note : 1. Measured with a 0.1 μF MLCC.						

Absolute Maximum Ratings					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (100 ms)	5.0 Vdc Input			7	VDC
	12 Vdc Input			15	
	15 Vdc Input			18	
	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 “5”	5000			VAC
Isolation Resistance	Input-output		1000			MΩ
Isolation Capacitance	Input-output			10		pF
Leakage Current	250VAC, 60Hz			2.0		μA
Working Voltage					300	Vrms
Clearance / Creepage	2.54 mm Pin pitch		6			mm
	2 mm Pin pitch		9			
Overvoltage Category	2.54 mm Pin pitch		OV2			
	2 mm Pin pitch		OV3			
Common Mode Transient Immunity	1 kV Common mode Voltage		65			kV/μs
Switching Frequency			20			kHz
Reliability Calculated MTBF	MIL-HDBK-217 F @ 25 °C		2400			k hours
Insulation System			Reinforced Insulation			
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		95	°C
Maximum Case Temperature					115	°C
Thermal Impedance			30			°C/W
Operating Altitude					5000	m
Pollution Degree			PD2			
Storage Humidity					95	% rel. H
Storage Temperature			-55		125	°C
Cooling	Natural Convection		30 - 65 LFM			

EMC Specifications			
Parameter	Standard	Condition	Criterion
Conducted Emissions	EN55032	with external components	B
Radiated Emissions	EN55032		B
ESD	IEC 61000-4-2	Air: ±15 kV / / Indirect: ±6 kV	A
RS	IEC 61000-4-3	10 V/m	A
EFT	IEC 61000-4-4	±2 kV with external components	A
Surge	IEC 61000-4-5	±2 kV with external components	A
CS	IEC 61000-4-6	10 Vrms	A
PFMF	IEC 61000-4-8	100 A/m	A

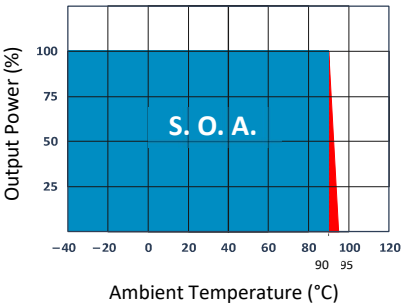
Physical Specifications	
Parameter	Value
Case Material	Nonconductive Black Plastic (UL94V-0 rated)
Pin Material	Tinned copper
Potting Material	Silicone (UL94V-0 rated)
Weight	4.3 g, typ.
Dimensions	0.77" x 0.39" x 0.49"

Electrical Characteristic Curves

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.

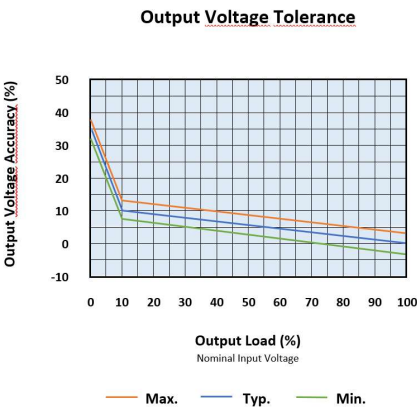
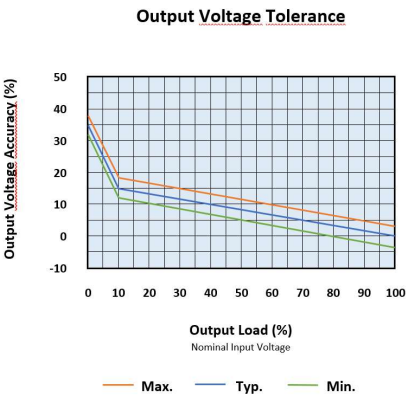
Temperature Derating Curve



All Models

Output Voltage Tolerance Envelope Curve

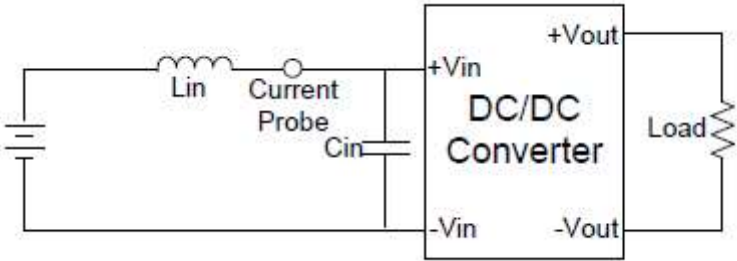
Output Voltage Tolerance Curve



Test Configurations

Input Reflected Ripple Current Test Step

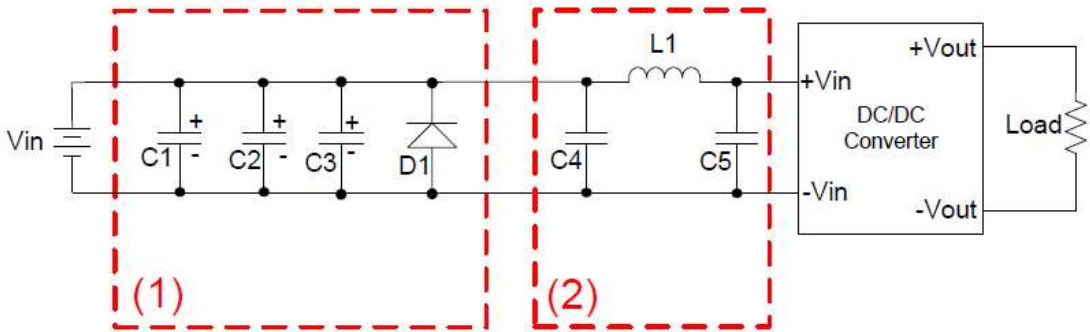
Input reflected ripple current is measured with a source inductor L_{in} (22 μ H) and a source capacitor C_{in} (47 μ F, ESR < 1.0 Ω at 100 kHz) at nominal input and full load.



EMC Filter Details

EMC Filter

The part (1) Circuit is used to meet Surge & EFT test, and the part (2) Circuit is used to meet EMI test.



V in	C1, C2	C3	D1	C4	C5	L1
5 V	Nippon Chemi-con KY-Series 680μF / 100V	Nippon Chemi-con KY-Series 680μF / 100V	SMDJ8.0A	MLCC 4.7μF / 50V	DNP	6.8μH
12 V		DNP	SMDJ16.0A	MLCC 10μF / 50V	MLCC 4.7μF / 50V	
15 V			SMDJ18.0A			
24 V			SMDJ28.0A			

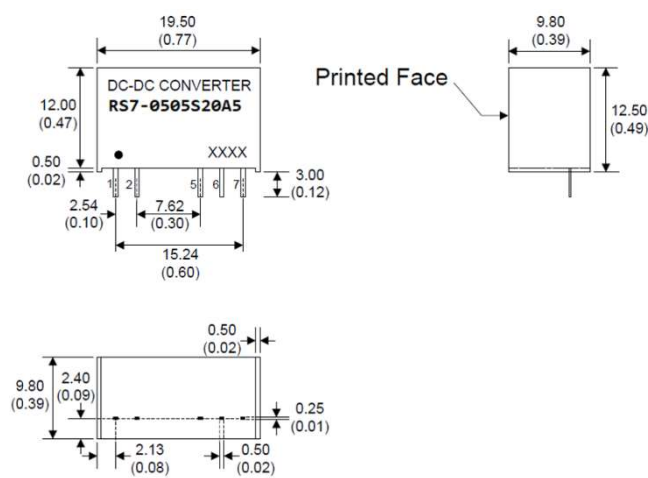
Pin Connections

Standard Pin pitch		
PIN NUMBER	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
5	-Vout	-Vout
6	N.P.	COM
7	+Vout	+Vout
	*N.P. : No PIN	

2 mm Pin pitch		
PIN NUMBER	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
7	-Vout	-Vout
8	N.P.	COM
9	+Vout	+Vout
	*N.P. : No PIN	

Mechanical Specifications

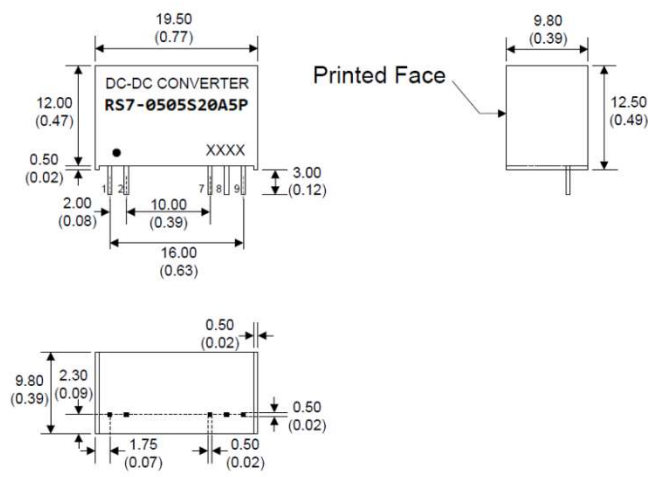
Standard Pin pitch



- 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

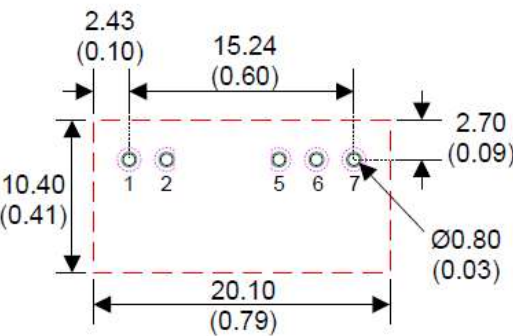
2 mm Pin pitch



- 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

Standard Pin pitch

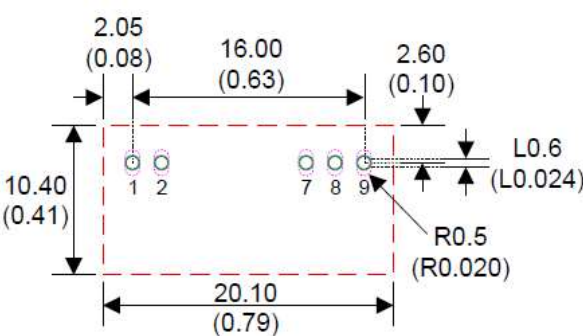


Notes : All dimensions are typical in millimeters (inches).

1. Through hole (black): Ø 0.80 (0.031)
2. Top view pad (green): Ø 1.00 (0.039)
3. Bottom view pad (pink): Ø 1.60 (0.063)
pad 2 to pad 5 spacing: 6.00 (0.236)

There should be at least 6mm distance
between primary and secondary circuit.

2 mm Pin pitch



Notes : All dimensions are typical in millimeters (inches).

1. Through hole (black): Ø 0.90 (0.035)
2. Top view pad (green): Ø 1.00 (0.039)
3. Bottom view pad (pink): Groove R0.50 L0.80
Groove (0.020) (0.031)

There should be at least 9mm distance
between primary and secondary circuit.

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.