

ISOLATED DC/DC CONVERTERS

36 - 75 Vdc Input 7 Vdc /20 A Output



0RQ1-C5T07x

RoHS Compliant

Rev.D

- Isolated
- Fixed Frequency (300 kHz)
- High Efficiency
- High Power Density
- Input Under/Over Voltage Lockout
- Output Voltage Trim
- Positive/Negative Remote Sense
- Low Cost
- Output Over-Voltage Shutdown
- Over Temperature Protection
- SCP/OCP
- Remote On/Off
- Basic Isolation



Description

The 0RQ1-C5T07x is an isolated dc/dc converter that operates from a nominal 48 Vdc source. This unit will provide up to 140 W of output power from a nominal 48 Vdc input. This unit is designed to be highly efficient and low cost. Features include remote on/off, over current protection and under-voltage lockout. This converter is provided in an industry standard quarter brick package.

Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Model Number Active High	Model Number Active Low
7 Vdc	36 Vdc - 75 Vdc	20 A	140 W	93.5%	0RQ1-C5T07A	0RQ1-C5T07B
7 Vdc	36 Vdc - 75 Vdc	20 A	140 W	93.5%	0RQ1-C5T070	0RQ1-C5T07L

Notes: 1. Add "G" suffix at the end of the model number to indicate Tray Packaging.
2. All part numbers above indicate RoHS 6. Change the second letter "R" to "7" for RoHS 5 part numbers.

Absolute Maximum Ratings

Parameter	Min	Typ	Max	Notes
Continuous Input Voltage	-0.3 V	-	80 V	
Transient Input Voltage (100ms)	-0.3 V	-	100 V	
Remote On/Off	-0.3 V	-	18 V	
Ambient Temperature	-40 °C	-	85 °C	
Storage Temperature	-55 °C	-	125 °C	

Note: All specifications are typical at 25 °C unless otherwise stated.

Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	36 V	48 V	75 V	
Input Current (full load)	-	-	4.8 A	
Input Current (no load)	-	60 mA	80 mA	
Remote Off Input Current	-	10 mA	20 mA	
Input Reflected Ripple Current (pk-pk)	-	10 mA	20 mA	With simulated source impedance of 10 uH, 5 Hz to 20 MHz; use a 100 uF/100 V electrolytic capacitor with ESR = 1 ohm max at 200 kHz
Input Reflected Ripple Current (rms)	-	2 mA	5 mA	
I ² t Inrush Current Transient	-	0.05 A ² s	0.1 A ² s	
Turn-on Voltage Threshold	33 V	34 V	35 V	
Turn-off Voltage Threshold	31 V	32 V	33 V	

Note: All specifications are typical at nominal input, full load at 25 °C unless otherwise stated.

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Output Specifications

Parameter		Min	Typ	Max	Notes	
Output Voltage Set Point		6.86 V	7.0 V	7.14 V	V _{in} =48 V, full load	
Load Regulation		-	±15 mV	±30 mV		
Line Regulation		-	±10 mV	±20 mV		
Regulation Over Temperature (-40deg.C-85deg.C)		-	±0.01%Vo/C	±0.02%Vo/C		
Output Current Range		0 A	-	20 A		
Output DC Current Limit		23.5 A	28 A	32 A		
Ripple and Noise (rms)		-	20 mV	35 mV	0-20MHz BW, with a 1μF ceramic capacitor and a 10μF tantalum capacitor at output	
Ripple and Noise (pk-pk)		-	70 mV	100 mV		
Short Circuit Surge Transient		-	3 A ² s	5 A ² s		
Turn on time			15 mS	25 mS		
Overshoot at Turn on		-	0%	3%		
Output Capacitance		0 uF	-	3300 uF		
Transient Response						
50% ~ 75% Max Load	Overshoot	Vo=7 V	-	150 mV	200 mV	di/dt=0.1A/us, Vin=48 Vdc, Ta=25 °C, with a 1μF ceramic capacitor and a 10uF Tantalum cap at output.
	Settling Time		-	50 uS	100 uS	
75% ~ 50% Max Load	Overshoot		-	150 mV	200 mV	
	Settling Time		-	50 uS	100 uS	

Note: All specifications are typical at nominal input, full load at 25 °C unless otherwise stated.

General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency	91.5%	93.5%	-	V _{in} =48 V, full load
Switching Frequency	310 kHz	320 kHz	330 kHz	
Isolation Capacitance	-	1500 pF	-	
Input to Output Isolation Voltage	-	-	1500 V	
Output Voltage Protection	-	130%Vo	-	V _{in} =48 V, full load, in hiccup mode
Remote Sense Compensation	-	-	10%Vo	The total voltage increased by trim and remote sense should not exceed 10%Vo.
Output Voltage Trim Range	80%Vo	-	110%Vo	
Over Temperature Protection	-	125 °C	-	
MTBF	3M hours			Calculated Per Bell Core SR-332 (V _{in} =48 V, I _o =normal, Ta = 25 °C)
Dimensions Inches millimeters	2.34 x 1.51 x 0.53 59.49 x 38.40 x 13.49			0RQ1-C5T07A & 0RQ1-C5T07B
Dimensions Inches millimeters	2.28 x 1.45 x 0.402 57.88 x 36.83 x 10.21			0RQ1-C5T070 & 0RQ1-C5T07L
Weight	-	70 g	-	

Note: All specifications are typical at 25 °C unless otherwise stated.

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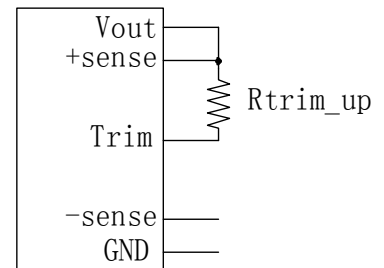
Control Specifications

Parameter		Min	Typ	Max	Notes
Remote On/Off					
Signal Low (Unit On)	Active Low	-0.3 V	-	0.8 V	0RQ1-C5T07B and 0RQ1-C5T07L, The remote on/off pin open, Unit Off.
Signal High (Unit Off)		3.5 V	-	18 V	
Signal Low (Unit Off)	Active High	-0.3 V	-	0.8 V	0RQ1-C5T07A and 0RQ1-C5T07O, The remote on/off pin open, Unit On.
Signal High (Unit On)		3.5 V	-	18 V	
Current Sink		0 mA	-	5 mA	

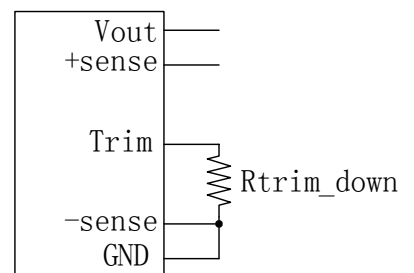
Output Trim Equations

Equations for calculating the trim resistor are shown below. The Trim Down resistor should be connected between the Trim pin, GND pin and -sense pin. The Trim Up resistor should be connected between the Trim pin, Vout pin and the +sense pin. Only one of the resistors should be used for any given application.

$$R_{trim_up} = \frac{(100 + \delta) \cdot V_o \cdot 5.11 - 626}{1.225 \cdot \delta} - 10.22 [k\Omega]$$



$$R_{trim_down} = \frac{511}{|\delta|} - 10.22 [k\Omega]$$



Note:

$$\delta = \frac{(V_{adj} - V_o)}{V_o} \times 100 [\%]$$

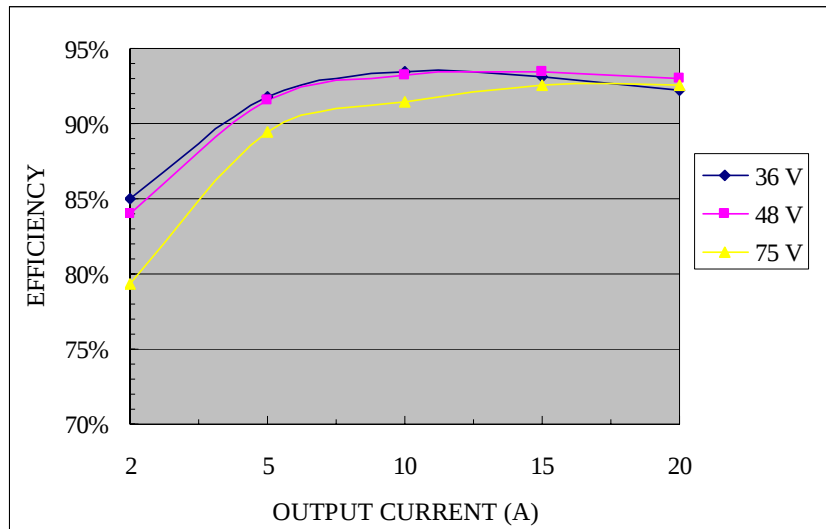
V_{adj} is the desired output voltage
V_o = 7V @I_{out}=0

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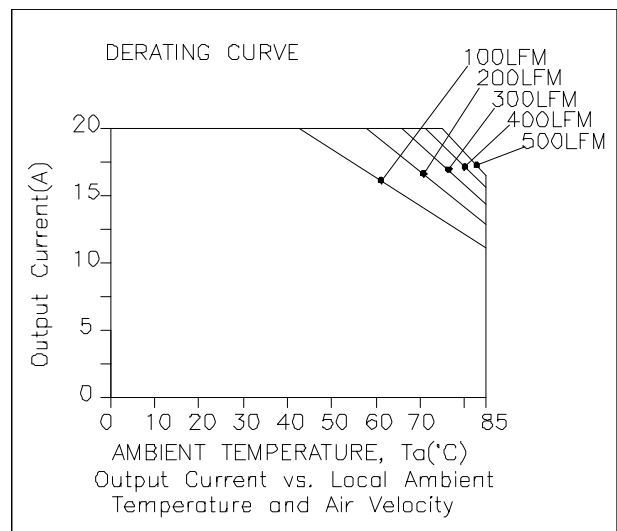
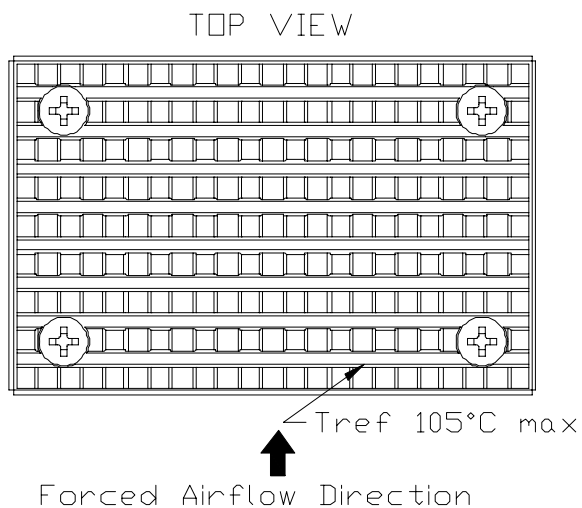
36 - 75 Vdc Input 7 Vdc /20 A Output

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Efficiency Data



Thermal Derating Curve

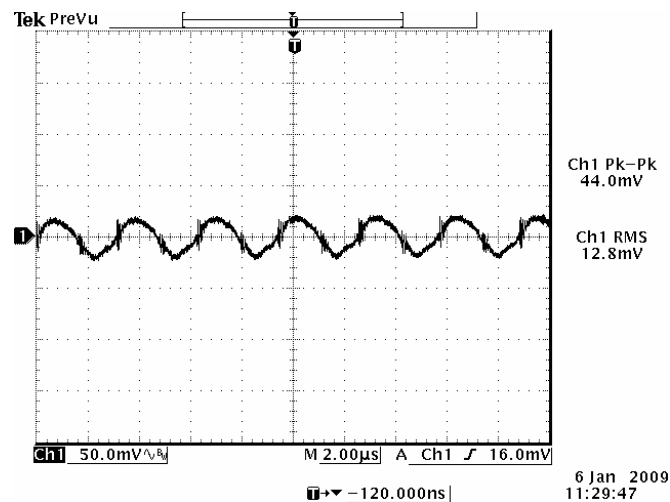


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36 - 75 Vdc Input 7 Vdc /20 A Output

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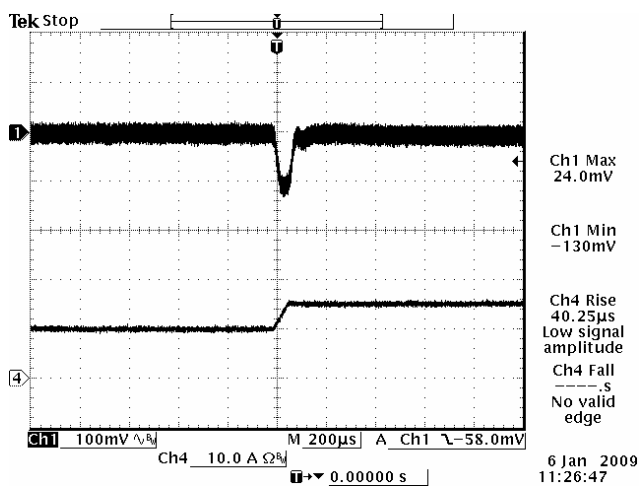
Ripple and Noise Waveform



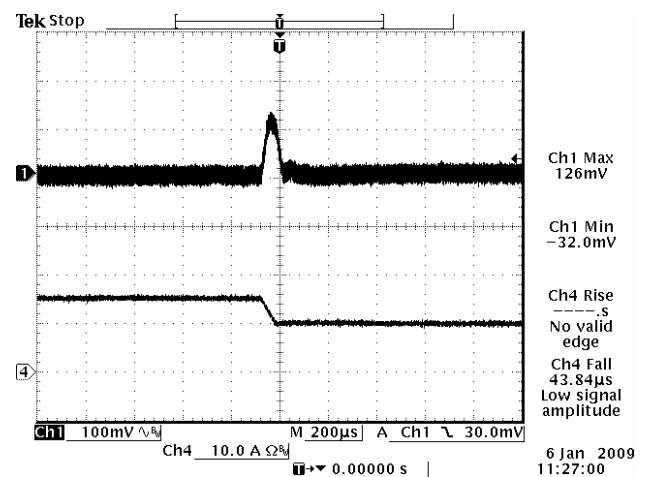
48Vdc input, 7Vdc/20A output

Note: Ripple and noise at full load, with a 1uF ceramic cap and a 10 uF Tantalum cap at output, Ta=25 deg C.

Transient Response Waveform



50%-75% Load Transients at Vin=48V



75%-50% Load Transients at Vin=48V

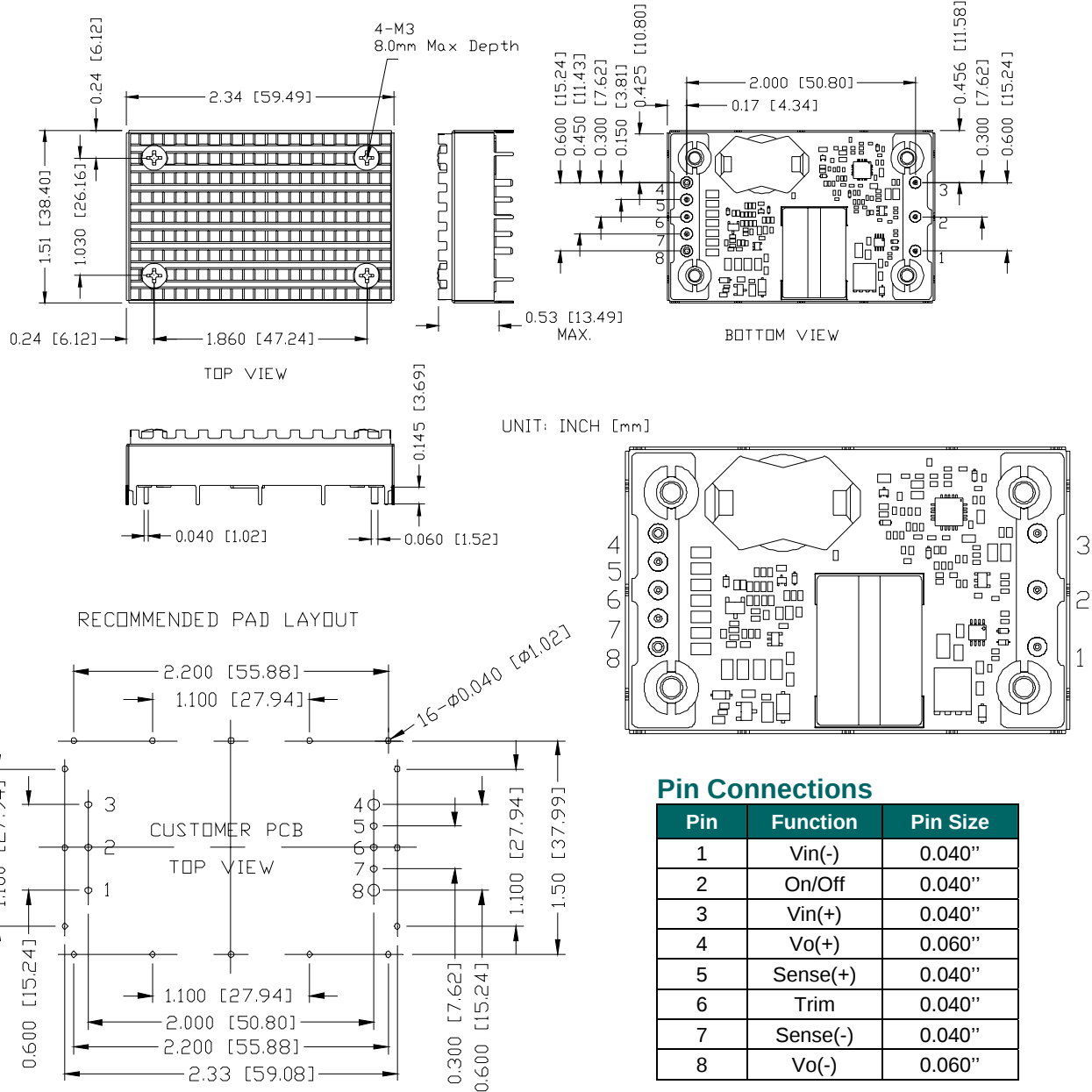
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36 - 75 Vdc Input 7 Vdc /20 A Output

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Mechanical Outline

0RQ1-C5T07A & 0RQ1-C5T07B



Notes: 1. Pin 5 must be connected to Vo(+).
2. Pin 7 must be connected to Vo(-).

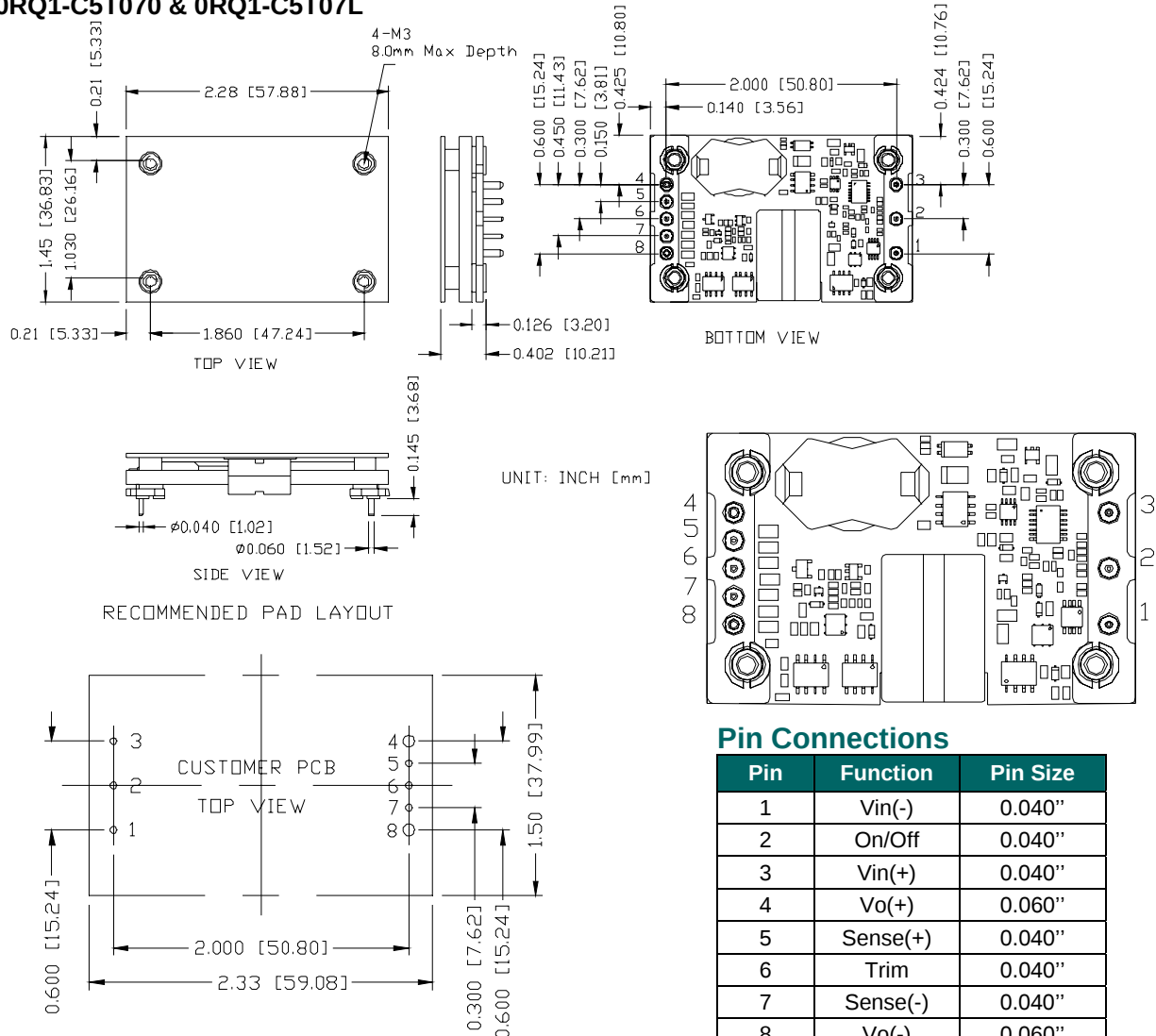
ISOLATED DC/DC CONVERTERS

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Mechanical Outline

0RQ1-C5T070 & 0RQ1-C5T07L



Pin Connections

Pin	Function	Pin Size
1	Vin(-)	0.040"
2	On/Off	0.040"
3	Vin(+)	0.040"
4	Vo(+)	0.060"
5	Sense(+)	0.040"
6	Trim	0.040"
7	Sense(-)	0.040"
8	Vo(-)	0.060"

Notes: 1. Pin 5 must be connected to Vo(+).
2. Pin 7 must be connected to Vo(-).

RoHS Compliance

Complies with the European Directive 2002/95/EC, calling for the elimination of lead and other hazardous substances from electronic products.



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