



## FEATURES

- Short circuit protection options
- UL 60950 recognised
- Single Isolated output
- 1kVDC or 3kVDC option 'Hi Pot Test'
- Wide temperature performance at full 0.75W load -40°C to 85°C
- Industry Standard Pinout
- 3.3V and 5V Inputs
- 3.3V, 5V & 12V outputs
- Pin Compatible with LME, MEE1, MEE3, NKE, NME, & NML series

## PRODUCT OVERVIEW

The CME series are a cost effective 0.75W DC-DC converter series, in industry standard packages with industry standard pinout. Popular input and output voltages are available as a lower power alternative to a 1W DC-DC converter. The galvanic isolation allows the device to be configured to provide an isolated negative rail in systems where only positive rails exist. The wide temperature range guarantees startup from -40°C and full 0.75 watt output at 85°C. For the short circuit protected parts (PC) protection is continuous and auto-resetting on removal of the short circuit.

## SELECTION GUIDE

Order Code	Nominal Input				Output Current				Load Regulation		Ripple & Noise				Efficiency		Isolation Capacitance		MTTF <sup>1</sup> kHrs			
	V	V	mA	mA	Input Current at Rated Load		%		mV p-p		%		pF	MIL. kHrs	Tel.							
					Typ.	Max.	Typ.	Max.	Min.	Typ.	Typ.	Max.										
<b>CME0505DC</b>	5	5	150	218	10	12	15	25	67	70	30	3400										
<b>CME0505SC</b>	5	5	150	218	10	12	15	25	67	70	30	3400										
<b>CME0512SC</b>	5	12	63	195	5	7	20	30	72	77	33	2200										
<b>3kVDC isolation options</b>																						
<b>CME0303S3C</b>	3.3	3.3	227	300	9	12	15	25	66	73	30	1230										
<b>CME0305S3C</b>	3.3	5	150	300	9	12	15	25	68	73	35	630										
<b>CME0505S3C</b>	5	5	150	218	9	12	15	25	65	70	28	2400										
<b>CME0512S3C</b>	5	12	63	200	5	7	10	15	70	75	30	630										
<b>Short Circuit Protection Options</b>																						
<b>CME0505SPC</b>	5	5	150	195	7.5	9	11	25	74	76.5	22	2887	47047									
<b>CME0505DPC</b>	5	5	150	195	7.5	9	11	25	74	76.5	22	2887	47047									

## INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	Continuous operation, 3.3V input types	2.97	3.3	3.63	V
	Continuous operation, 5V input types	4.5	5.0	5.5	
Input short circuit current	Short circuit variants	95			mA
Input reflected ripple current	3.3V input types	1.5	2		mA p-p
	5V input types	2	2.5		
	Short circuit types	3	15		

## OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power <sup>2</sup>	T <sub>A</sub> =-40°C to 85°C, see derating graphs			0.75	W
Voltage Set Point Accuracy	See tolerance envelope				
Line regulation	High V <sub>IN</sub> to low V <sub>IN</sub> ; Short circuit types	1.15	1.2		%/%
	High V <sub>IN</sub> to low V <sub>IN</sub> ; All other output types	1.0	1.2		

## ISOLATION CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	C Versions Flash tested for 1 second	1000			VDC
	3C Versions Flash tested for 1 second	3000			
Resistance	V <sub>ISO</sub> = 1000VDC	10			GΩ

## GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
CME0505XC		120			kHz
	Short circuit types	91			
All other types		135			

## ABSOLUTE MAXIMUM RATINGS

Lead temperature 1.5mm from case for 10 seconds	260°C
Input voltage V <sub>IN</sub> , 3.3V input	5.5V
Input voltage V <sub>IN</sub> , 5V input	7V

1. Calculated using MIL-HDBK-217 FN2 and Telcordia SR-332 calculation model with nominal input voltage at full load.

2. See derating curve.

All specifications typical at T<sub>A</sub>=25°C, nominal input voltage and rated output current unless otherwise specified.

**TEMPERATURE CHARACTERISTICS**

Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	-40		85	
Storage		-50		130	
Case temperature rise above ambient	3.3V & 5V output types			41	°C
	12V output types			32	
	Short circuit types (DIP)		23		
	Short circuit types (SIP)		24		
Cooling	Free air convection				

### TECHNICAL NOTES

#### ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

Murata Power Solutions CME series of DC-DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second for C versions and 3kVDC for 1 second for 3C versions.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

The CME has been recognised by Underwriters Laboratory for functional insulation, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. 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 several hundred 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

It is well known that 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. The CME series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enamelled 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 this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognised parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

### SAFETY APPROVAL

The CME series has been recognised by Underwriters Laboratory (UL) to UL 60950 for functional insulation in a maximum ambient temperature of 85°C and/or case temperature limit of 100°C for CMExxxxC, 130°C for CMExxxS3C. Case temperature measured on the face opposite the pins.

The CME series of converters are not internally fused so to meet the requirements of UL 60950 an anti-surge input line fuse should always be used with ratings as defined below.

CME03xxS3C: 0.9A

CME05xxxC: 0.5A

All fuses should be UL recognised and rated to 125V.

File number E151252 applies.

### RoHS COMPLIANCE INFORMATION

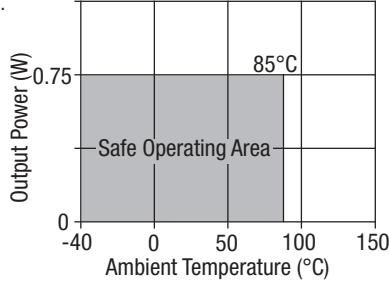


This series is compatible with RoHS soldering systems with a peak wave solder temperature of 260°C for 10 seconds. The pin termination finish on the SIP package type is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The DIP types are Matte Tin over Nickel Preplate. Both types in this series are backward compatible with Sn/Pb soldering systems.

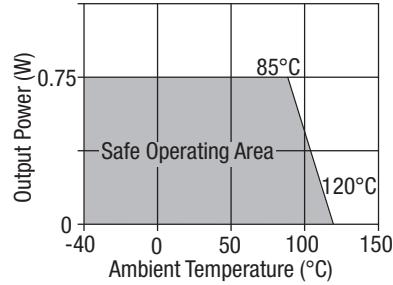
For further information, please visit [www.murata-ps.com/rohs](http://www.murata-ps.com/rohs)

### TEMPERATURE DERATING GRAPHS

0303, 0305 & Short Circuit types.



All other types.



**EFFICIENCY VS LOAD**

**CME0505XC**

**CME0512SC**

**CME0303S3C**

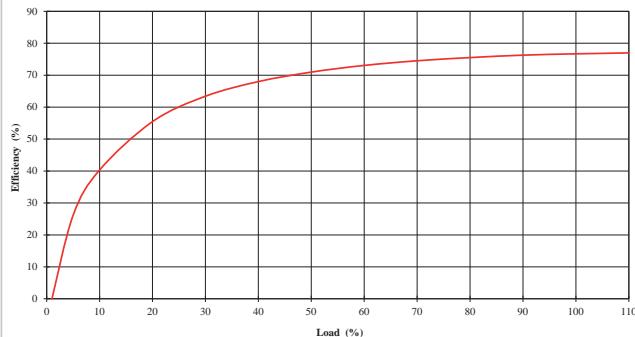
**CME0305S3C**

**CME0505S3C**

**CME0512S3C**

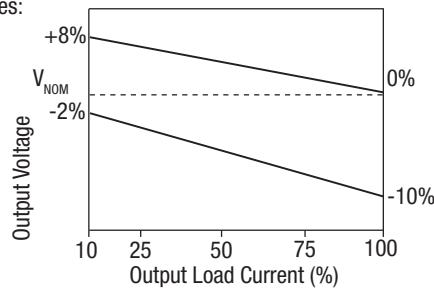
**EFFICIENCY VS LOAD CONTINUED**

**CME0505XPC**

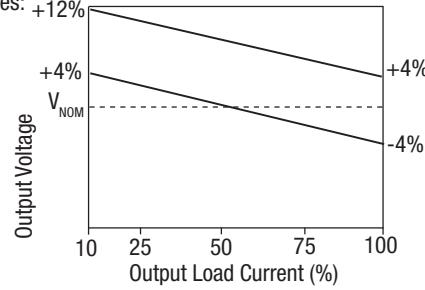


**TOLERANCE ENVELOPES**

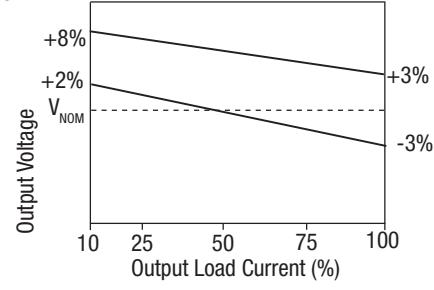
3.3V output types:



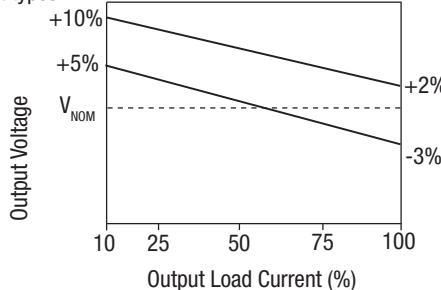
5V output types: +12%



12V output types:



Short circuit types:



The voltage tolerance envelope shows typical load regulation characteristics for this product series. The tolerance envelope is the maximum output voltage variation due to changes in output loading.

**APPLICATION NOTES**

**Minimum load**

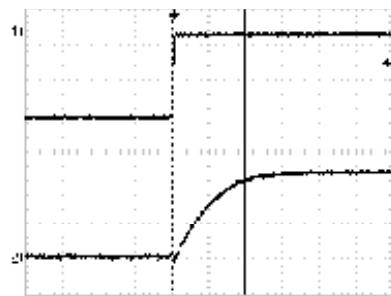
The minimum load to meet datasheet specification is 10% of the full rated load across the specified input voltage range. Lower than 10% minimum loading will result in an increase in output voltage, which may rise to typically double the specified output voltage if the output load falls to less than 5%.

**Capacitive loading and start up**

Typical start up times for this series, with a typical input voltage rise time of 2.2 $\mu$ s and output capacitance of 10 $\mu$ F, are shown in the table below. The product series will start into a capacitance of 47 $\mu$ F with an increased start time, however, the maximum recommended output capacitance is 10 $\mu$ F.

	Start-up time
	$\mu$ s
CME0505DC	1000
CME0505SC	1000
CME0512SC	5600
CME0303S3C	540
CME0305S3C	1300
CME0505S3C	1080
CME0512S3C	5000
CME0505XPC	350

Typical Start-Up Wave Form



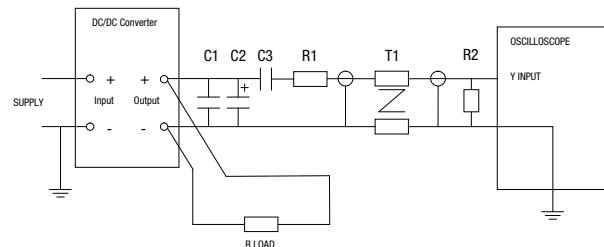
**Ripple & Noise Characterisation Method**

Ripple and noise measurements are performed with the following test configuration.

C1	1 $\mu$ F X7R multilayer ceramic capacitor, voltage rating to be a minimum of 3 times the output voltage of the DC-DC converter
C2	10 $\mu$ F tantalum capacitor, voltage rating to be a minimum of 1.5 times the output voltage of the DC-DC converter with an ESR of less than 100m $\Omega$ at 100 kHz
C3	100nF multilayer ceramic capacitor, general purpose
R1	450 $\Omega$ resistor, carbon film, $\pm 1\%$ tolerance
R2	50 $\Omega$ BNC termination
T1	3T of the coax cable through a ferrite toroid
RLOAD	Resistive load to the maximum power rating of the DC-DC converter. Connections should be made via twisted wires

Measured values are multiplied by 10 to obtain the specified values.

**Differential Mode Noise Test Schematic**



**APPLICATION NOTES (continued)**

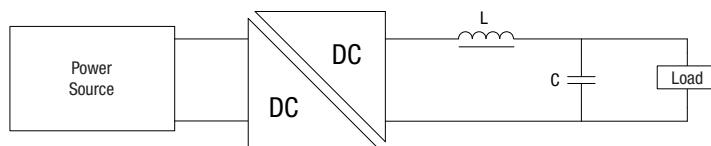
**Output Ripple Reduction**

By using the values of inductance and capacitance stated, the output ripple at the rated load is lowered to 5mV p-p max.

**Component selection**

Capacitor: It is required that the ESR (Equivalent Series Resistance) should be as low as possible, ceramic types are recommended. The voltage rating should be at least twice (except for 15V output), the rated output voltage of the DC-DC converter.

Inductor: The rated current of the inductor should not be less than that of the output of the DC-DC converter. At the rated current, the DC resistance of the inductor should be such that the voltage drop across the inductor is <2% of the rated voltage of the DC-DC converter. The SRF (Self Resonant Frequency) should be >20MHz.

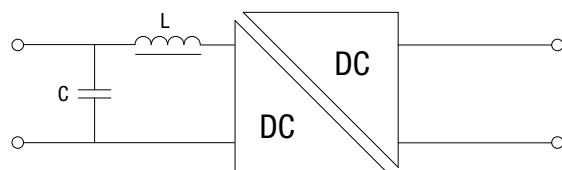


	Inductor			Capacitor
	L, $\mu$ H	SMD	Through Hole	
CME0505DC	47	82473C	11R473C	4.7
CME0505SC	47	82473C	11R473C	4.7
CME0512SC	68	82683C	11R683C	1
CME0303S3C	10	82103C	11R103C	4.7
CME0305S3C	47	82473C	11R473C	4.7
CME0505S3C	10	82103C	11R103C	4.7
CME0512S3C	68	82683C	11R683C	0.68
CME0505XPC	22	82223C	11R223C	1

**EMC FILTERING AND SPECTRA**

**FILTERING**

The following filter circuit and filter table shows the input filters typically required to meet EN 55022 Curve B, Quasi-Peak EMC limit, as shown in the following plots. The following plots show positive and negative quasi peak and CISPR22 Average Limit B (pink line) and Quasi Peak Limit B (green line) adherence limits.



Part Number	Inductor			Capacitor
	L, $\mu$ H	SMD	Through Hole	
<b>CME0505XC</b>				
<b>CME0512SC</b>				
<b>CME0303S3C</b>				
<b>CME0305S3C</b>				
<b>CME0505S3C</b>				
<b>CME0512S3C</b>				
<b>CME0505XPC</b>	10	82103C	13R103C	1

**CME0505XC**

**CME0512SC**

**CME0303S3C**

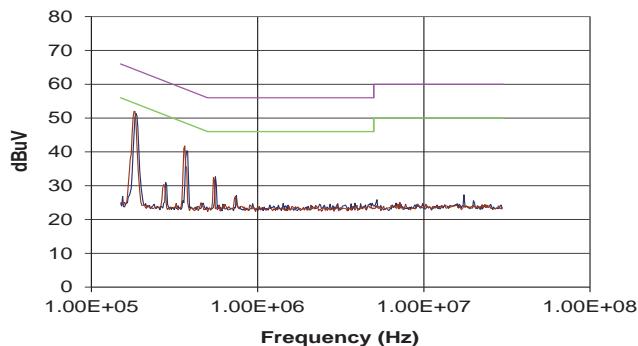
**CME0305S3C**

**EMC FILTERING AND SPECTRA**

**CME0505S3C**

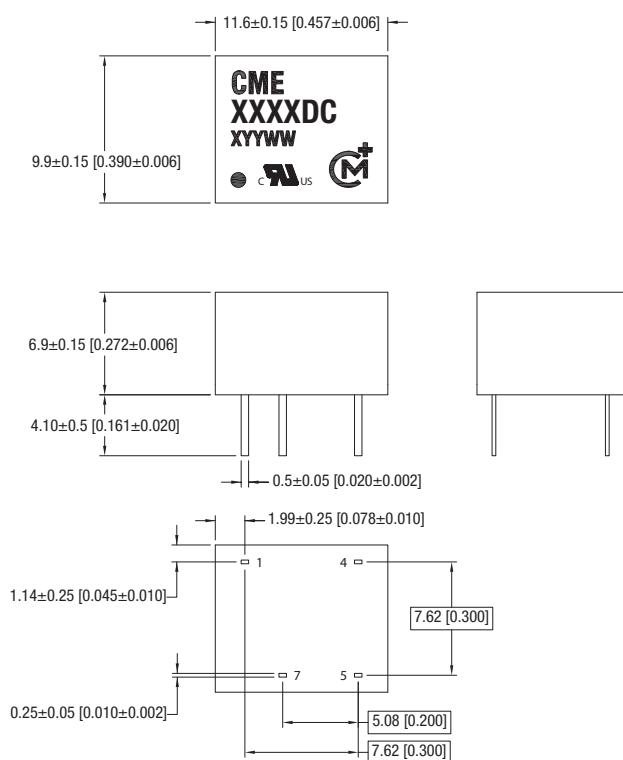
**CME0512S3C**

**CME0505XPC**

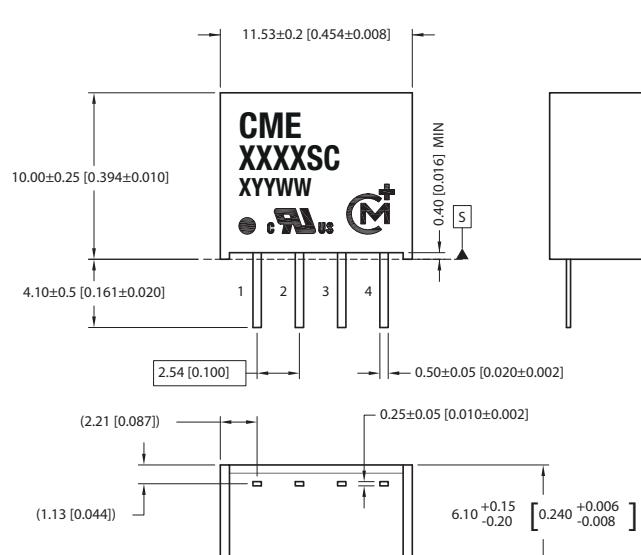


**PACKAGE SPECIFICATIONS**

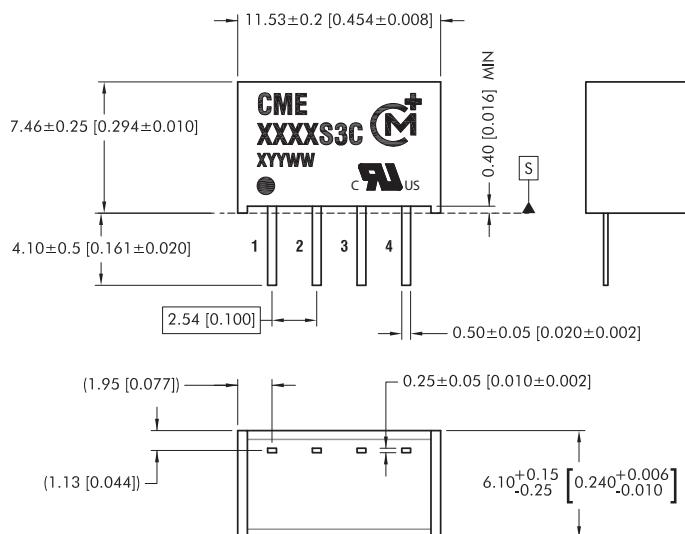
DC Package



SC Package



3C Package



**PIN CONNECTIONS - 4 PIN SIP**

Pin	Function
1	-V <sub>IN</sub>
2	+V <sub>IN</sub>
3	-V <sub>OUT</sub>
4	+V <sub>OUT</sub>

**PIN CONNECTIONS - 8 PIN DIP**

Pin	Function
1	-V <sub>IN</sub>
4	+V <sub>IN</sub>
5	+V <sub>OUT</sub>
7	-V <sub>OUT</sub>

All dimensions in mm (inches) Controlling dimension is mm.

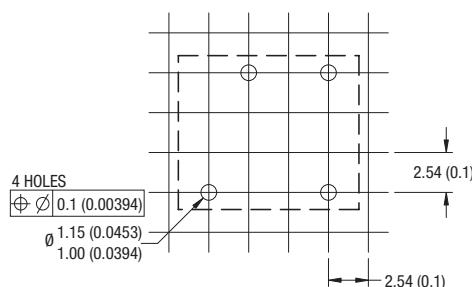
All pins on a 2.54 (0.100) pitch and within  $\pm 0.1$  (0.004) of true position from pin 1 at seating plane 'S'

Weight: 1.09g (3C) 1.30g (SC) 1.38g (DC) 1.5g (DPC)

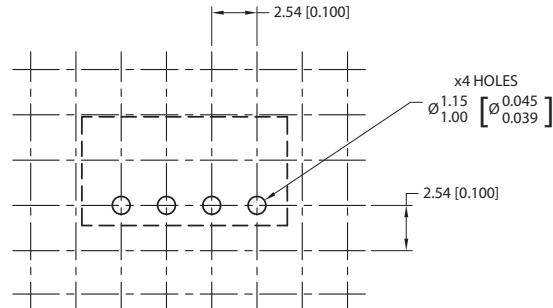
**PACKAGE SPECIFICATIONS (continued)**

**RECOMMENDED FOOTPRINT DETAILS**

8 Pin DIP Package

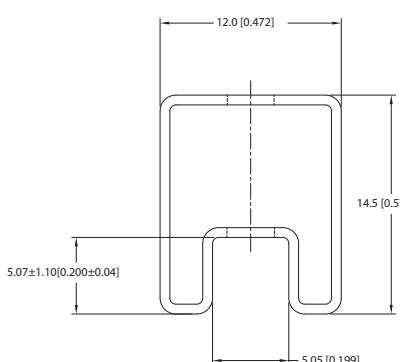


4 Pin SIP Package

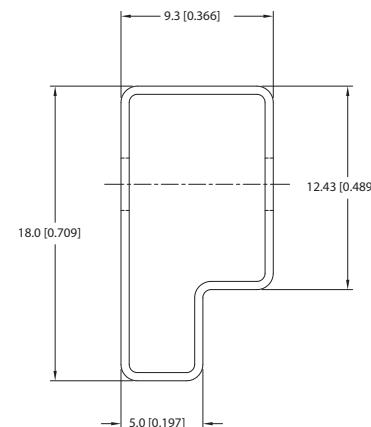


**TUBE OUTLINE DIMENSIONS**

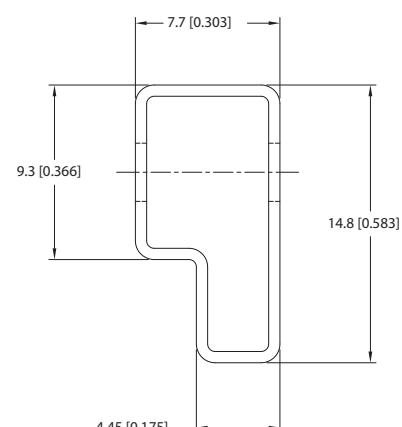
8 Pin DIP Package



4 Pin SIP



3C SIP



Unless otherwise specified all dimensions in mm [inches]  $\pm 0.55\text{mm}$  [0.022].  
 Tube Length (DC&SC): 520mm [20.472]  $\pm 2.0$  [0.079].  
 Tube Length (3C): 525mm [20.669]  $\pm 2.0$  [0.079].

Tube Quantity(DC&SC): 35  
 (3C) : 40



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 Refer to: <http://www.murata-ps.com/requirements/>

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