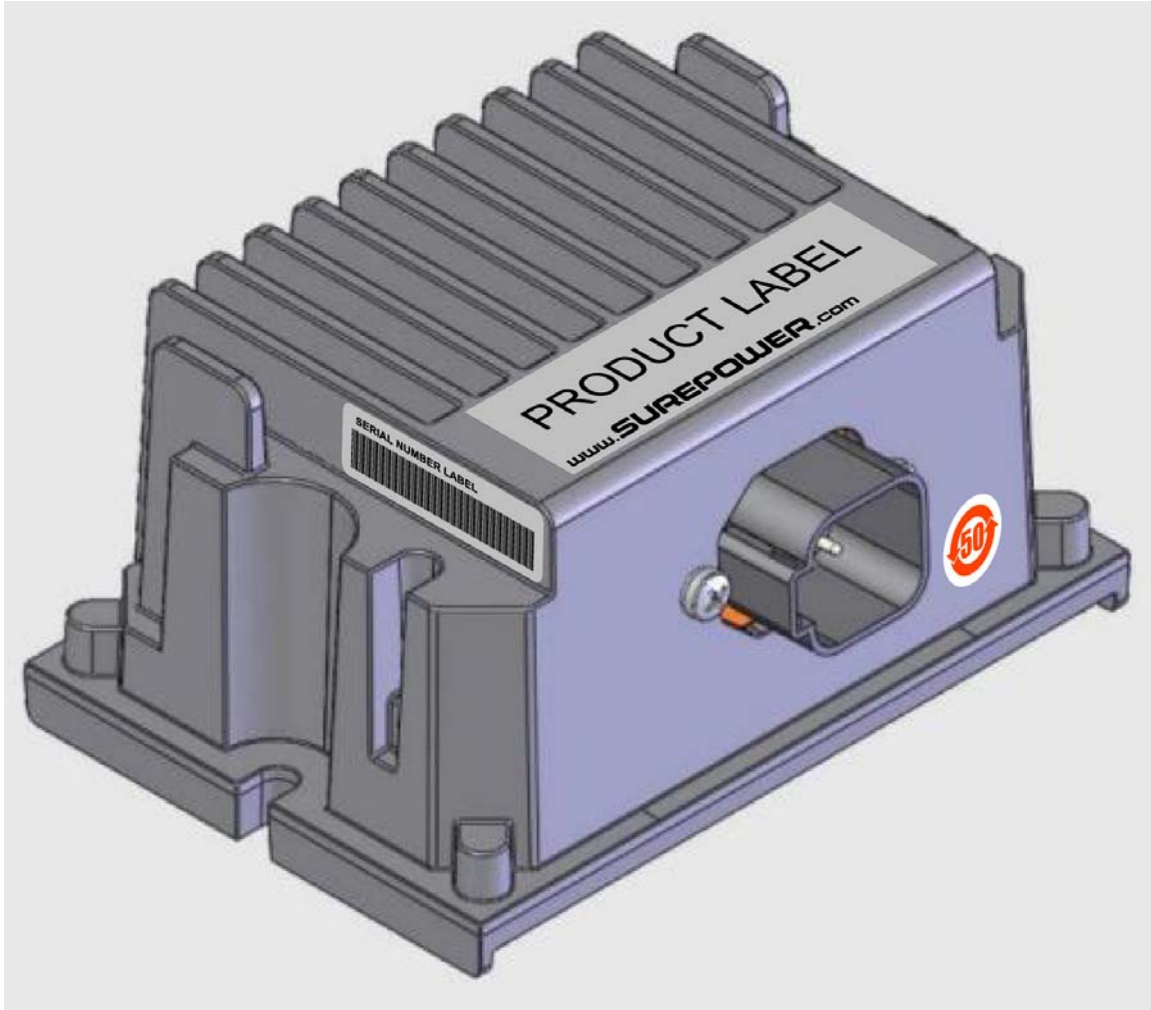


REVISIONS				
REV	ECO	DESCRIPTION	DATE	BY
002	5340	ADD CE MARK – ADD SPECIFICATION FOR THERMAL CYCLE AND THERMAL SHOCK – ADD 'e11 03 4947' COMPLIANCE MARK - ADD WEIGHT	4/23/09	GF
003	5465	OMIT GREEN 'e' MARK – ADD ORANGE '50' MARK ADD <a href="http://WWW.SUREPOWER.COM">WWW.SUREPOWER.COM</a> LOGO TO PRODUCT LABEL	10/05/09	JT
004	5627	OMIT PRODUCT AND SERIAL NUMBER LABEL DETAIL	05/10/10	JT

## SPECIFICATION OUTLINE

### 21012C10 Converter

### 24V to 12V/ 12 Amps, with Switched output



<p style="text-align: center;"><b>UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES [MM]</b></p> <p>TOLERANCES ARE: .XX ± .10 [X.X ± 2.5] .XXX ± .030 [X.XX ± 0.76] INTERPRET GEOMETRIC DIMENSIONS AND TOLERANCING PER ASME Y14.5-1994 DRAWINGS IN THIS DOCUMENT ARE NOT TO SCALE</p>		<p style="text-align: center;">A Part Of <b>COOPER</b> Bussmann</p>	
<b>APPROVALS</b>		<b>DATE</b>	
DRAWN BY <span style="float: right;">MAM</span>		11/28/07	
PROJECT ENG APPROVAL			
ENG MANAGER APPROVAL			
PRODUCT MANAGER APPROVAL			
SIZE <b>A</b>	CAGE CODE NO. <b>55156</b>	DRAWING NO. <b>21012C10</b>	REV <b>004</b>
SCALE: NONE		FILE: 21012C10-004	SHEET <b>1</b> OF <b>10</b>

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## THEORY OF OPERATION

The 21012C10 is a 12A DC to DC converter. The converter is used to provide energy for 12V apparatus from a 24V source.

The converter provides both a switched output and an unswitched output. The switched output responds to the IGNITION input. When the IGNITION input is active the switched output is enabled. The feature is primarily used when the converter is used to power a radio with memory requirements. If a switched output is not required then the unswitched output should be used, and the ignition input and switched output pins can be left unconnected.

The converter is designed to withstand the severe electrical environment of heavy-duty trucks and off highway equipment. The converter can withstand load dump, reverse battery, short circuit, and over-temperature without damage to the unit.


The switched output is implemented using a MOSFET transistor. Due to the MOSFET body diode the switched output should never be connected to a battery or voltage source.

Protection circuits include an over voltage monitor for input voltage and over temperature monitor attached to the PCB near the internal FET's. Both monitors can shut the converter off until the corresponding out of range condition is corrected.

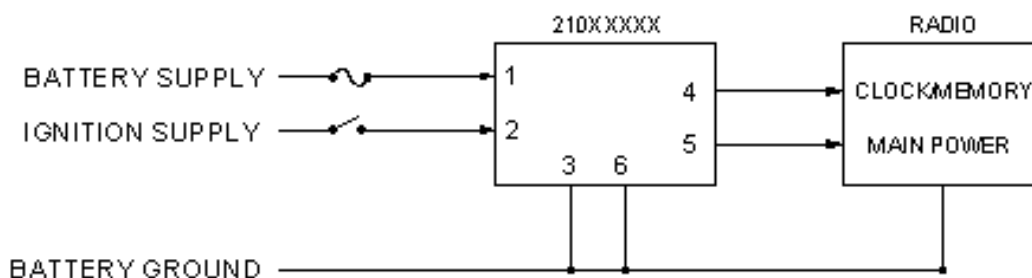
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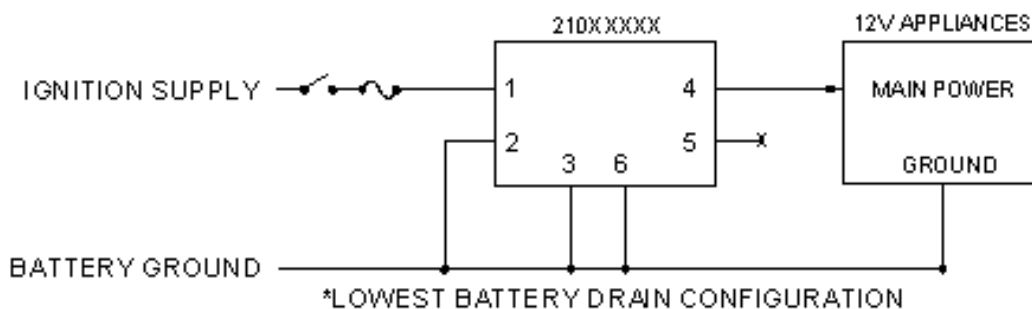
**SURE POWER INC.**

 A Part Of <b>COOPER</b> Bussmann			
TITLE			
<b>MODEL NO: 21012C10</b> <b>24V/12V,12 AMP CONV,RoHS</b> <b>WITH SWITCHED OUTPUT</b> <b>SPECIFICATION OUTLINE</b>			
SIZE	CAGE CODE NO.	DRAWING NO.	REV
<b>A</b>	<b>55156</b>	<b>21012C10</b>	<b>004</b>
SCALE: NONE	FILE: 21012C10-004	SHEET <b>2</b> OF <b>10</b>	

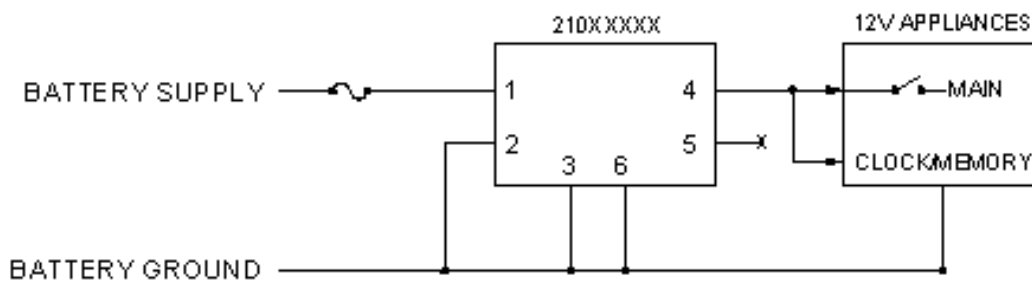
TYPICAL 'IGNITION SWITCHED' APPLICATION  
WITH STANDBY OUTPUT




TYPICAL 'ALWAYS ON' APPLICATION



TYPICAL 'APPLIANCE SWITCHED' APPLICATION WITH STANDBY



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SCALE: <b>NONE</b>	FILE: <b>21012C10-004</b>	SHEET <b>3</b> OF <b>10</b>	

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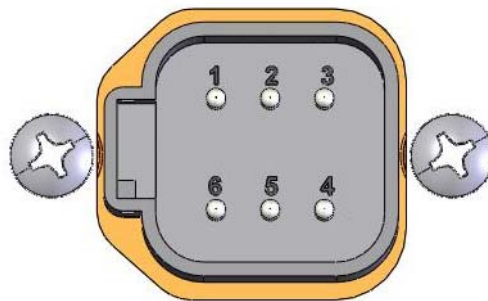
# FUNCTIONAL DESCRIPTION

## Connections

Connections to the unit are made via a 6 pin connector. The terminals are as follows:

### Deutsch connector DT13-6P

Pin 1	+24V Input Voltage	Input voltage to the converter.
Pin 2	Ignition	Switched output <b>control lead</b> , active high.
Pin 3	Ground	System ground.
Pin 4	+12V Unswitched	Unswitched output voltage.
Pin 5	+12V Switched	Switched output voltage, controlled by Pin 2 above.
Pin 6	Ground	System ground.




### DEUTSCH MATING CONNECTOR

HOUSING:	DT06-6S
SOCKET:	0462-209-16141
LOCK:	W6S

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TITLE			
MODEL NO: 21012C10 24V/12V, 12 AMP CONV, RoHS WITH SWITCHED OUTPUT SPECIFICATION OUTLINE			
SIZE	CAGE CODE NO.	DRAWING NO.	REV
A	55156	21012C10	004
SCALE: NONE	FILE: 21012C10-004	SHEET 4 OF 10	


## ENVIRONMENTAL SPECIFICATIONS

Characteristic	Parameter	Unit	Notes:
Operational Temperature Range	-40 to +85	°C	Ambient temperature
Storage Temperature Range	-55 to +105	°C	
Over-Temp Limit	105	°C	Approximate case temperature that activates the over-temperature protection circuit.
Maximum Heatsink Temperature	100	°C	Heatsink temperature must be kept below this value to prevent activation of over-temperature shutdown circuit.
Humidity	0 to 95	%RH	SAE J1455, Rev Aug 94, Section 4.2
Salt Spray	96	Hrs	ASTM B117-07
Handling Shock	Will show damage		SAE J1455, Rev Aug 94, Section 4.10
Sealing	+/-35	kPa	Sealed against water and water vapor.
Vibration	9.26Grms, 20 – 2kHz		MIL-STD-202G, Method 214A, Fig. 214-1, Test Condition 1C
Immersion	1 meter		1 meter for ½ hour. IEC 60529, Rev 2.1, IP67
Pressure wash			SAE J1455, Rev June 2006, Section 4.5
Shock	30g, 11mS, ½ sine		MIL-STD-202G, Method 213B, Conditions J
Thermal Cycle	-40 to +85 100 cycles	°C	SAE J1455, Rev June 2006 Sect 4.1.3.1, Fig 2B
Thermal Shock	-40 to +85 10 cycles	°C	SAE J1455, Rev June 2006 Sect 4.1.3.2, Fig 2C

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SCALE: NONE	FILE: 21012C10-004	SHEET <b>5</b> OF <b>10</b>	

# ELECTRICAL SPECIFICATIONS

## MAXIMUM RATINGS:


Maximum ratings establish the maximum electrical rating to which the unit may be subjected without damage.

Characteristic	Parameter	Unit	Notes:
Standoff Voltage	36	V	Applied between pins 1 and 2 relative to pins 3 and 6. Unit must remain functional after this voltage is removed.
Time at Standoff	5	min	25°C
Reverse Polarity	-32	V	This is the maximum reverse voltage that may be applied between pins 1 and 2 relative to pins 3 and 6 without permanent unit damage.
Time at Reverse Polarity	1	Hr	Tested at 85°C per SAE J1455, Rev Aug 94, Section 4.11.1
Maximum Allowable Load	12	A	Output current is the sum of the currents from the switched and unswitched outputs.

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SCALE: NONE	FILE: 21012C10-004	SHEET <b>6</b> OF <b>10</b>	

## ELECTRICAL CHARACTERISTICS:


Unless otherwise stated, conditions apply to full temperature range and full input voltage range.

Characteristic	MIN	TYP	MAX	Unit	Notes:
Input voltage operating range	18	27.5	32	V	Output voltage to remain within specified output range under full load.
Input Over Voltage Turn OFF	34		36	V	Converter will shutdown within this range and above, 25°C.
Input Voltage for Turn ON	18			V	Converter must have this input voltage level to start up into specified maximum load.
Maximum Input Current			10.8	A	Input voltage 18V, load of 12A, 25°C
Quiescent Current		5	7	mA	Input Voltage 24V. Current draw from the input with no load attached to either output, and ignition off. 25°C.
Efficiency	85%	90%			Over entire input voltage range at rated output current at 25°C.
Output Voltage	13.2	13.7	14.2	V	Over entire input voltage range at rated output current at 25°C.
Output Operational Current Limit	13.0	14.7	16.1	A	Sum of unswitched and switched outputs with output voltage within specified range.
Recommended input fuse		20A			External fuse on input wiring
Output Short Circuit Current Limit			20	A	Input voltage 18V, output voltage less than 2 Volts.
			20	A	Input voltage 27.5V, output voltage less than 2 Volts.
			20	A	Input voltage 32V, output voltage less than 2 Volts.

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SCALE: NONE	FILE: 21012C10-004	SHEET <b>7</b> OF <b>10</b>	

## ELECTROMAGNETIC COMPATIBILITY


Immunity to Radiated Electromagnetic Fields	Level	Notes:
Bulk Current Injection (BCI) Method	60 mA	<b>SAE J1113-4, Rev Aug 2004</b> Requirements = Class B, Region 2
30 MHz to 18 GHz, Absorber-Lined Chamber	60 V/m	<b>SAE J1113-21, Rev Oct 2005</b> Requirements = Status 2

Conducted Immunity	Level	Notes
250 kHz to 400 MHz Direct Injection of Radio Frequency (RF) Power	200mW	<b>SAE J1113-3, Rev Sep 2006</b> Requirements = Class B, Region 2, Level 3

Emissions	Level	Notes:
Conducted Emissions	Class 2	<b>SAE J1113-41, REAF May 2000</b> <b>Section 5</b> Conducted Emissions - Component/Module
Radiated Emissions	Class 2	<b>SAE J1113-41, REAF May 2000</b> <b>Section 7</b> Radiated Emissions - Component/Module

Transient Immunity Test	Level	Notes:
Inductive Switching	24V Vehicle	<b>SAE J1455, Rev Aug 94, table 4B compliant.</b>
Mutual Coupling	24V Vehicle	<b>SAE J1455, Rev Aug 94, table 4B compliant.</b>
Load Dump	24V Vehicle	<b>SAE J1455, Rev Aug 94, table 4B compliant.</b>

Electrostatic Discharge Immunity	Level	Notes:
ESD, Powered (In Vehicle)	±8kV direct ±15kV air	<b>SAE J1113/13, Rev Nov 2004</b> All connections and exposed parts.
ESD, Package and Handling	±8kV direct ±15kV air	<b>SAE J1113/13, Rev Nov 2004</b> 8kV max on pin 5

			
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Regulatory Requirements	Level	Notes:
Radiated Emissions	Per Standard	EU Directive 2004/108/EC as amended, ISO 13766 and EN13309
Emissions	Per Standard	EU Directives 72/245/EEC as amended
Immunity	Per Standard	EU Directives 72/245/EEC as amended
Restriction of the use of certain Hazardous Substances in electrical And electronic equipment	Per Standard	EU Directive 2002/95/EC as amended
End of Life Vehicles	Per Standard	EU Directive 2000/53/EC as amended
Requirements for concentration limits for certain hazardous substances in electronic information products	Per Standard	People's Republic of China legislation SJ/T 11363-2006

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<b>SCALE: NONE</b>	<b>FILE: 21012C10-004</b>	<b>SHEET 9 OF 10</b>	

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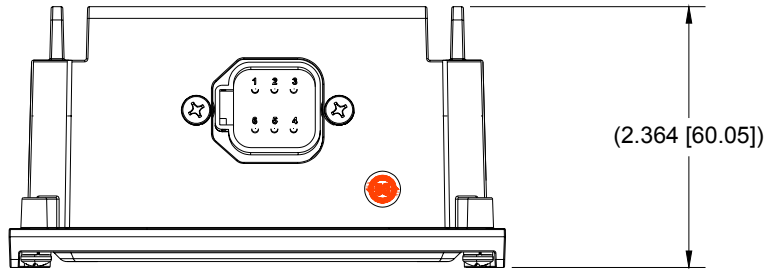
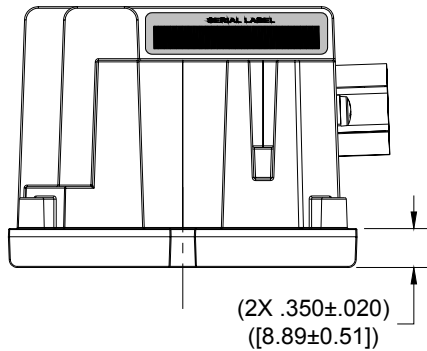
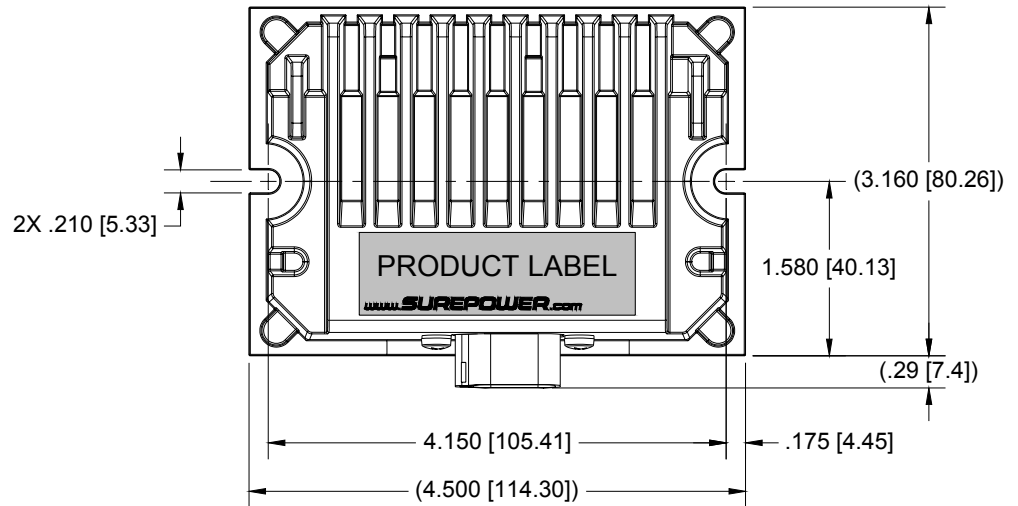
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# MECHANICAL SPECIFICATIONS

**CONVERTER WEIGHT:** 560 ± 56 grams


**UNIT DIMENSIONS:** Inches [Millimeters]



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