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REVISIONS

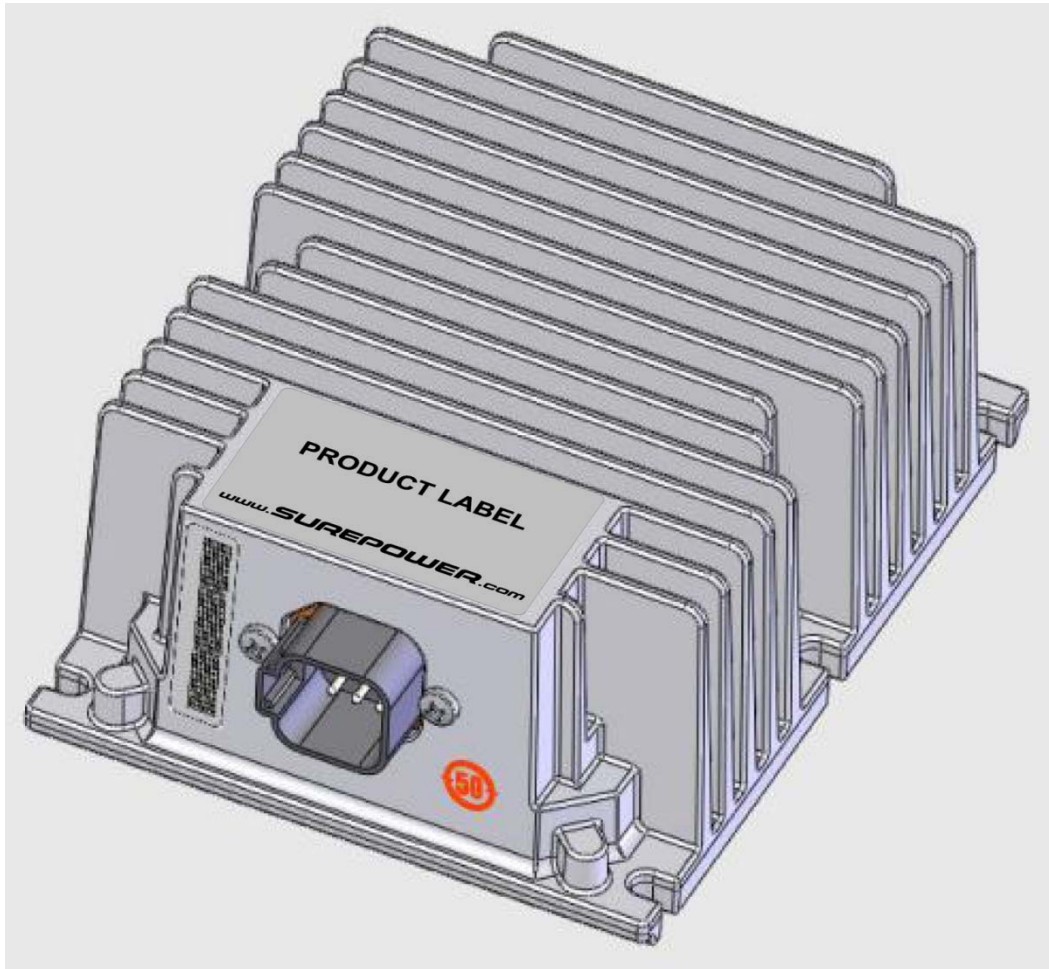
PLANT DIST CODE(S): U

REV	DESCRIPTION	DATE	BY
001	PRODUCTION RELEASE ECO 5479	10/2/09	GF
002	OMIT PRODUCT AND SERIAL NUMBER LABEL DETAIL - REPLACE APPROPRIATE SAE REFERENCES WITH ISO REFERENCES - ENHANCE REGULATORY REQUIREMENTS TABLE ECO 5663	5/26/10	BF
03	CORRECTION TO APPLICATION DIAGRAM BU-U14108	4/2/14	JD

SPECIFICATION OUTLINE

21020C10 Converter

24V to 12V/ 20 Amps, with Switched output



**UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES [MM]**
 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



Powering Business Worldwide

TITLE

**MODEL NO: 21020C10
 CONV,20A,24/12V,RoHS
 WITH SWITCHED OUTPUT
 SPECIFICATION OUTLINE**

APPROVALS	DATE
DRAWN BY JD	04/02/14

PROJECT ENG APPROVAL	
ENG MANAGER APPROVAL	
PRODUCT MANAGER APPROVAL	

SIZE	PLANT OF ORIGIN	DRAWING NO.	REV
A	U	21020C10	03

SCALE: NONE	FILE: 21020C10-03	SHEET 1 OF 11
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THEORY OF OPERATION

The 21020C10 is a 20A DC to DC converter. The converter is used to provide a regulated voltage 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.

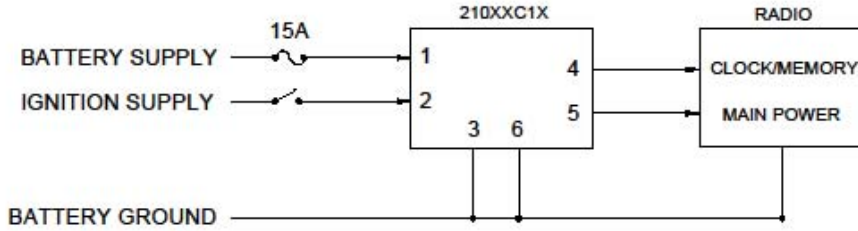
Protection circuits include an over voltage monitor for input voltage and over temperature monitor attached to the PCB near the internal FET's. Both monitors can shut the converter off until the corresponding out of range condition is corrected.

An additional protection circuit is used to protect the system loads in the event of a fault where the output voltage increases above its regulation. The output over protection circuit (OCP) will latch the converter off. This latch can be reset by removing and re-applying the input power.

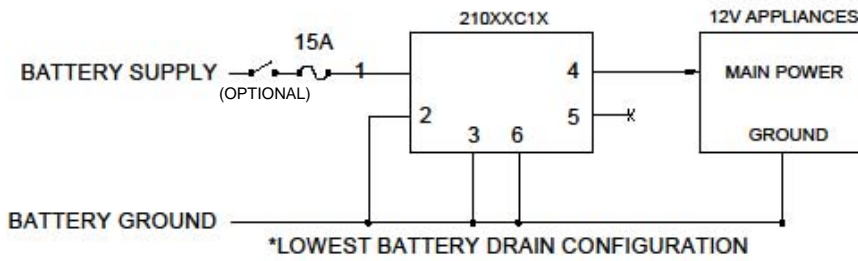


SIZE	PLANT OF ORIGIN	DRAWING NO.	REV
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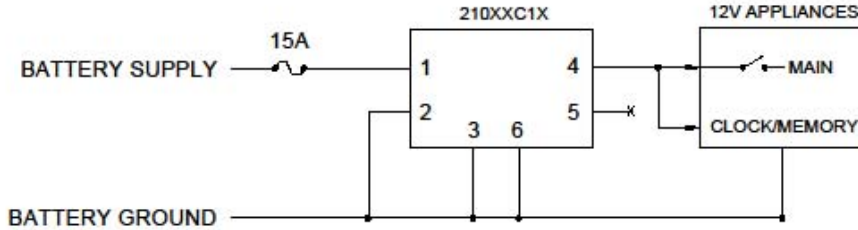
TYPICAL 'IGNITION SWITCHED' APPLICATION
WITH STANDBY OUTPUT



TYPICAL 'ALWAYS ON' APPLICATION



TYPICAL 'APPLIANCE SWITCHED' APPLICATION WITH STANDBY



SIZE A	PLANT OF ORIGIN U	DRAWING NO. 21020C10	REV 03
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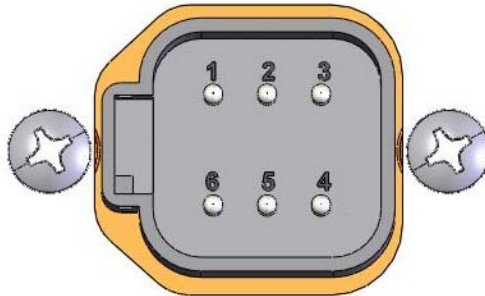
FUNCTIONAL DESCRIPTION

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 control lead, 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

* Recommend external fuse on input wiring (25A fuse minimum).



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ENVIRONMENTAL SPECIFICATIONS

Characteristic	Parameter	Unit	Notes:
Operational Temperature Range	-40 to +85	°C	See derating curve (Figure 1) below.
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. JUN2006, Section 4.2
Salt Spray	96	Hrs	ASTM B 117-07 and IEC 60068-2-11 Part 2, Test Ka
Handling Drop	Will show damage		SAE J1455, Rev. JUN2006, Section 4.10.3.1
Sealing	+/-35	kPa	Sealed against water and water vapor.
Vibration	9.26Grms, 5 Hz – 2kHz		MIL-STD-202G, Method 214A, Fig. 214-1, Test Condition 1C
Immersion	1 meter		1 meter for ½ hour. IEC 60529 Ed. 2.1, IP67
Water Ingress			DIN 40050 T9, IPX9K
Shock	30G, 11mS, ½ sine		MIL-STD-202G, Method 213B, Conditions J
Thermal Cycle	-40 to +85 12 cycles	°C	SAE J1455, Rev June 2006 Sect 4.1.3.1 Fig 2B
Thermal Shock	-55 to +90 100 cycles	°C	SAE J1455, Rev June 2006 Sect 4.1.3.1 Fig 2C



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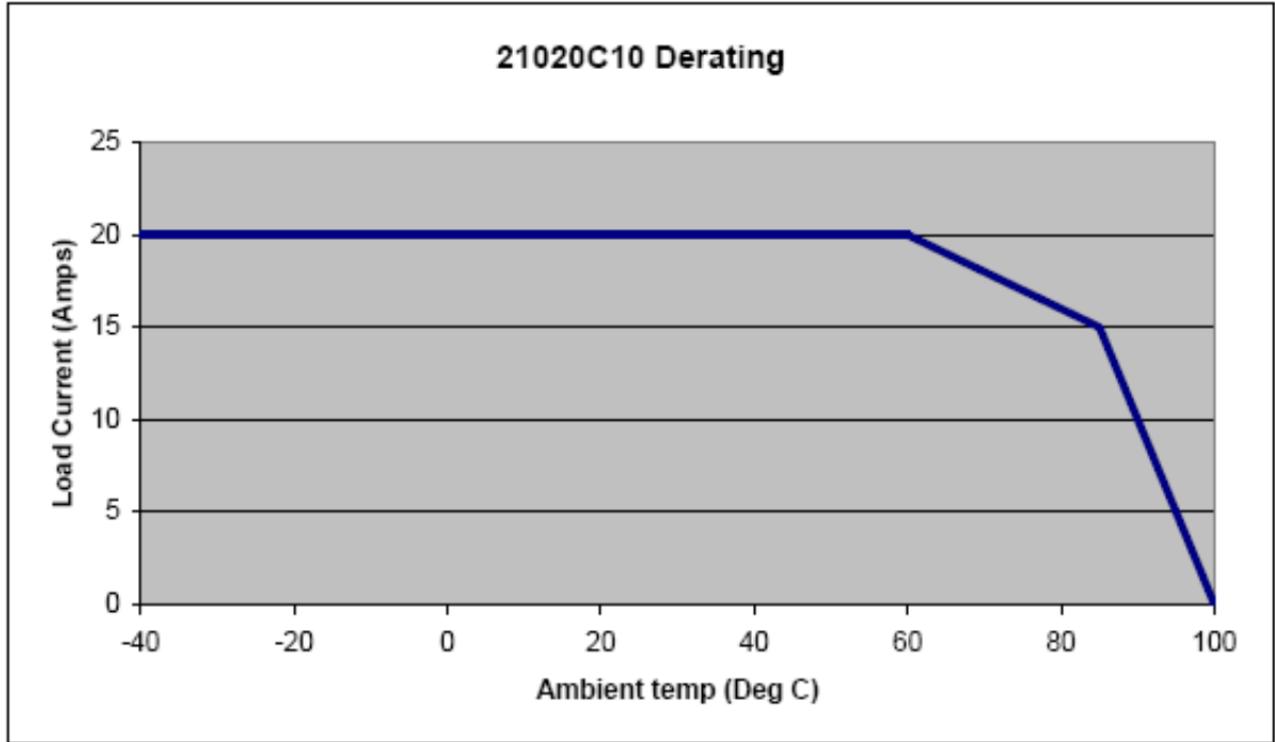


Figure 1



SIZE A	PLANT OF ORIGIN U	DRAWING NO. 21020C10	REV 03
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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	80	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	60	min	25C
Reverse Polarity	-52	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, Section 4.11.1
Maximum Allowable load	20	A	Output current is the sum of the currents from the switched and unswitched outputs.



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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	32		36	V	Converter will shutdown within this range and above.
Input Under Voltage Turn ON	18			V	Converter must have this input voltage level to start up into specified maximum load.
Maximum Input Current			18	A	Input voltage 18V, load of 20A, 25C
Quiescent Current		5	7	mA	Input Voltage 24V. Current draw from the input with no load attached to either output, and ignition off. 25C.
Efficiency	88%	92%			Over entire input voltage range at rated output current at 25C.
Output Voltage	13.2	13.7	14.2	V	Over entire input voltage range at rated output current at 25C.
Output Operational Current Limit	20	22		A	Sum of unswitched and switched outputs with output voltage within specified range.
Output Short Circuit Current Limit			32	A	Input voltage 18V to 32V, output voltage less than 2 Volts.
Ignition thresholds (SW Output on)	18			V	Ignition input will sink about 6 mA when greater than 15V is applied.



SIZE A	PLANT OF ORIGIN U	DRAWING NO. 21020C10	REV 03
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ELECTROMAGNETIC COMPATIBILITY

Immunity to Radiated Electromagnetic Fields	Level	Notes:
Bulk Current Injection (BCI) Method	180 mA	SAE J1113-4, Rev. AUG2004 Requirements = Class B, Region IV
30 MHz to 18 GHz, Absorber-Lined Chamber	100 V/m	SAE J1113-21, Rev. OCT2005 Requirements = Status 2

Conducted Immunity	Level	Notes
250 kHz to 400 MHz Direct Injection of Radio Frequency (RF) Power	200mW	SAE J1113-3, Rev. SEP2006 Requirements = Status II, Level 3

Emissions	Level	Notes:
Conducted Emissions	Class 2	SAE J1113-41, Rev. MAY2000 Section 5 Conducted Emissions - Component/Module
Radiated Emissions	Class 2	SAE J1113-41, Rev. MAY2000 Section 7 Radiated Emissions - Component/Module

Transient Immunity Test	Level	Notes:
Inductive Switching	Class B	ISO 7637-2, Ed. 2, Pulse 1
Inductive Switching	Class B	ISO 7637-2, Ed. 2, Pulse 2A & 2B
Switching Spikes	Class B	ISO 7637-2, Ed. 2, Pulse 3A & 3B
Starter Motor Engagement	Class B	ISO 7637-2, Ed. 2, Pulse 4
Load Dump	Class B	ISO 7637-2, Ed. 2, Pulse 5A & 5B



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ELECTROMAGNETIC COMPATIBILITY (CONT)

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

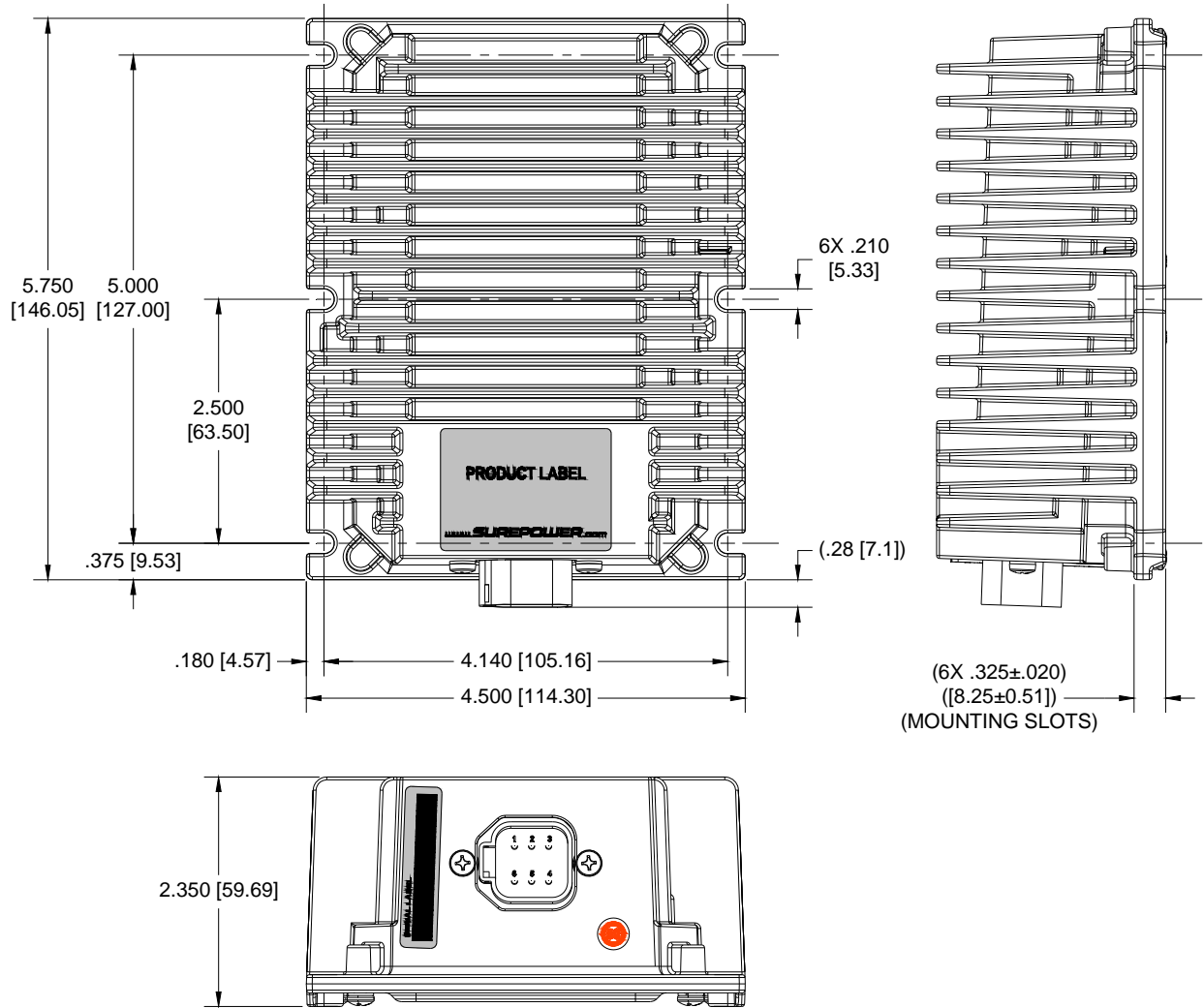
Regulatory Requirements	Level	Notes:
Radiated Emissions	Per Standard	EU Directive 2004/108/EC as amended, ISO 13766 and EN13309
Radiated Broadband and Narrowband Emissions	Per Standard	EU Directives 72/245/EEC as amended
Transient Immunity and Emissions	Per Standard	EU Directives 72/245/EEC as amended
Restriction on 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 2002/53/EC as amended
Testing Methods for Hazardous Substances in Electronic Information Products	Per Standard	People's Republic of China legislation SJ/T 11365-2006



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MECHANICAL SPECIFICATIONS

CONVERTER WEIGHT: 1023 - 1131 grams
UNIT DIMENSIONS: Inches [Millimeters]



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