KIMDU TECHNOLOGIES

General Description

KIMDU CORPORATION

P/N: SSIU-T-_____   S/N: _____   J2

Production date: _____

MOD   1 2 3 4 5 6 7 8 9 10   J1

The Kimdu Technologies newly updated Type 'D' Serial to Synchro Interface Unit (SSIU-T) contains up to four independent, 16-Bit Digital-To-Synchro converters. The serial inputs are decoded by the embedded CPU and written to the Synchro Converters. The user defines, via the serial bus, the synchro channel to be updated along with the angle data. In addition, the new Type 'D' version includes extensive BIT testing and status reporting capability. There is an additional, dedicated, RS-232 Serial Port for firmware uploads allowing field-programmable firmware updates. ARINC-429 is an optional serial input to the SSIU-T for ARINC-407 applications. Other optional interfaces include Ethernet 10/100 and Mil-Std-1553B. Contact Kimdu sales for information.

Uploading Firmware Operation

The SSIU-T allows for uploading firmware upgrades at your site avoiding having to send the unit back to the factory. There is an I/O connector pin that needs to be jumpered as defined in the J2 Pinout diagram. Wire an RS-232 cable to the J2 I/O connector or use an RS-232/USB dongle adapter along with a free PC-based software utility and upload a Kimdu-supplied Hex file to the SSIU.
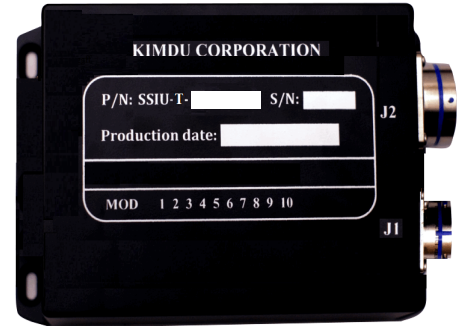
FEATURES:

♦ **Now Up to Four Synchro Channels**

♦ **Ruggedized Unit**

♦ **RS-232 or RS-422 Interface**

♦ **16-bit D/S Converter Resolution**

♦ **Up to 3VA Output per channel**

♦ **Optional Interfaces:**
  • **ARINC- 429**
  • **Ethernet**
  • **Mil-Std-1553B**

♦ **MIL-C-26482 Connectors**

♦ **Mil-Std-704 28vDC Power Supply**

♦ **Designed to meet Mil-Std-704E/461D**
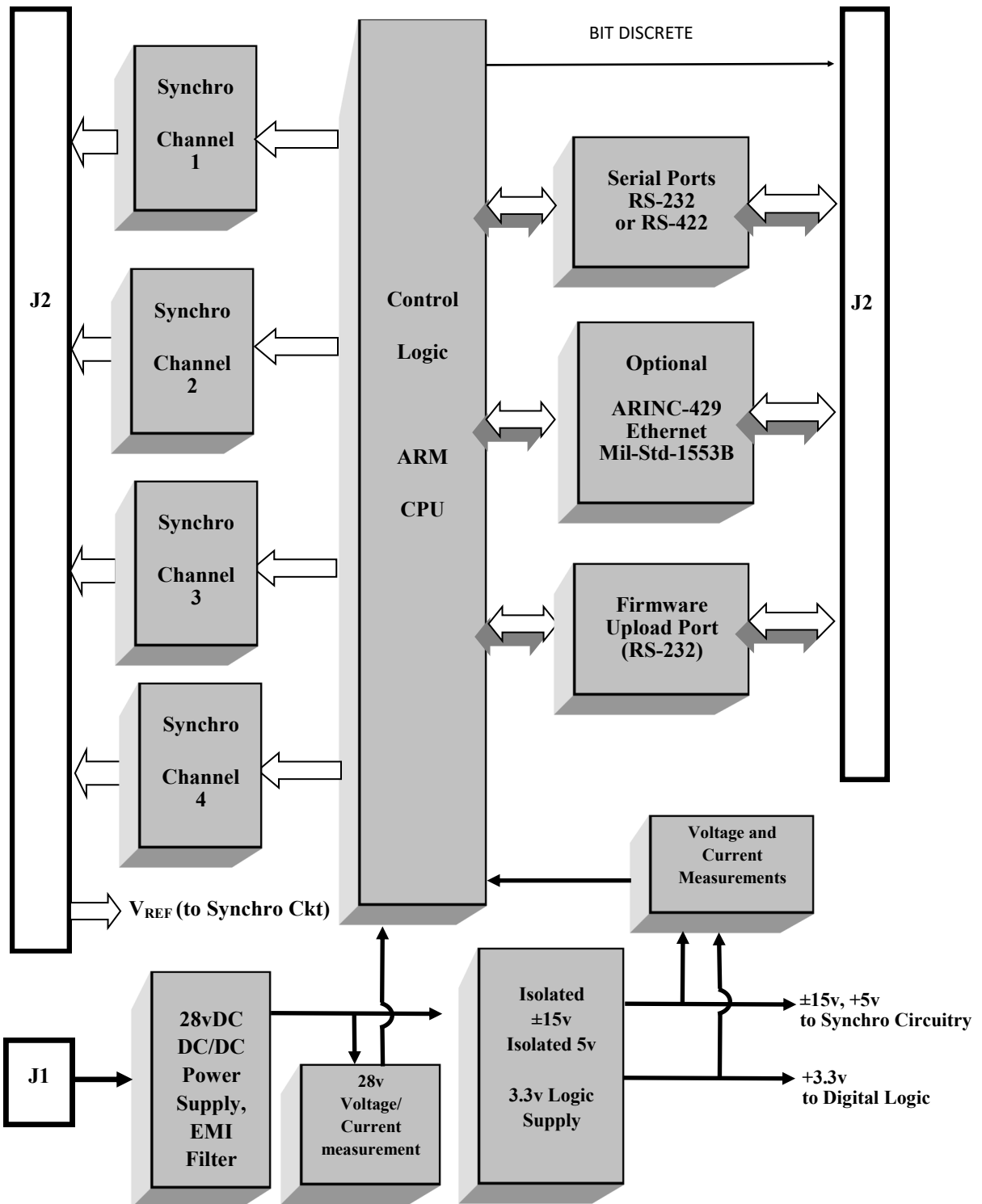
♦ **Extensive BIT Capability**

QUALITY

SUPPORT

AS9100:2016
ISO 9001:2015
CERTIFIED

BIT DISCRETE

Synchro Channel 1

Serial Ports RS-232 or RS-422

J2

Control Logic

Synchro Channel 2

Optional ARINC-429 Ethernet Mil-Std-1553B

ARM CPU

J2

Synchro Channel 3

Firmware Upload Port (RS-232)

Synchro Channel 4

Voltage and Current Measurements

V_{REF} **(to Synchro Ckt)**

28vDC DC/DC Power Supply, EMI Filter

J1

28v Voltage/ Current measurement

Isolated ±15v Isolated 5v

3.3v Logic Supply

±15v, +5v to Synchro Circuitry

+3.3v to Digital Logic

FUNCTIONAL BLOCK DIAGRAM

2

SSIU Operation:

The SSIU-T can be ordered with up to four Synchro channels with 4 minute accuracy. Note that the SSIU-T comes with output isolation transformers. These transformers affect the accuracy of the synchro conversion. The SSIU-T has 90v output levels (11.8v is also available). The Reference input requires 115v @ 400hz (or 26v @ 400Hz with option). The four Synchro channels are named: Channel 1 or "CH1", Channel 2 or "CH2", Channel 3 or "CH3", Channel 4 or "CH4".

SERIAL PORTS

The SSIU-T can be ordered with either RS-422 or RS-232 ports. Other interfaces are available (see Ordering Information at the end of this document for details).

A channel's angle is programmed by sending a command defining which channel along with the desired angle; "Synchro Channel", "Angle". The angle data consists of two bytes and the table below defines its structure. The angler data has a 16-bit resolution. The two date bytes are sent Lo Byte first followed by the Hi Byte.

Resolution Table

Bit weights for the binary inputs are given in the table below. The angle is determined by adding bits that are in the logic 1 state. <u>The synchro resolution is 0.0055 degrees per bit</u>. Bit 0 is the LSB within the word.

	BIT	DEG/BIT Resolution=16)
LSB	0	0.0055
	1	0.011
	2	0.022
	3	0.0439
	4	0.0879
	5	0.1758
	6	0.3516
	7	0.7031
	8	1.406
	9	2.813
	10	5.625
	11	11.25
	12	22.5
	13	45
	14	90
MSB	15	180

Host to SSIU-T Commands:

All commands [with data] sent to the SSIU-T will work only when W=1 and R=0 ('W' signifying "writing" data to the SSIU-T).

Set Angle & Communications Command

The Set Angle command consists of three bytes; Command byte followed by two data bytes containing the angle data (Low Byte followed by Hi byte). First byte of the Command is:

0	1	0	C0	C1	C2	-	W	R

Where C0, C1 and C2 are: defined as follows:

C0	C1	C2	FUNCTION	COMMENT
0	0	0	Channel 1	SET ANGLE FOR CHANNEL 1
0	0	1	Channel 2	SET ANGLE FOR CHANNEL 2
0	1	0	Channel 3	SET ANGLE FOR CHANNEL 3
0	1	1	Channel 4	SET ANGLE FOR CHANNEL 4
1	0	0	INVALID CODE	COMMAND IGNORED
1	0	1	INVALID CODE	COMMAND IGNORED
1	1	0	INVALID CODE	COMMAND IGNORED
1	1	1	Set Communication [parameters]	only works if W=1 and R=0

Set communication parameters

If this is a "Set Communication" command (C0=1, C1=1 C2=1), then the second byte will be as follows (there are only two bytes sent for this command):

B1	B2	B3	B4	P1	P2	S1	0

The

B1	B2	B3	B4	Baud Rate		P1	P2	PARITY		S1	STOP BITS
0	0	0	0	9600		0	0	NONE		0	1
0	0	0	1	14400		0	1	EVEN		1	2
0	0	1	0	19200		1	0	ODD			
0	0	1	1	38400		1	1	ILLEGAL			
0	1	0	0	57600							
0	1	0	1	115200							
0	1	1	0	230400							
0	1	1	1	460800							
1	0	0	0	921600							

default serial port settings are as follows:

- Baud rate: 115.2Kbaud
- Number of bits: 8
- Parity: No
- Number of Stop bits: 1
- Flow control: None

BIT Request

Bit Request consists of one byte sent to the SSIU-T. To initiate BIT request, the Host must send the command byte with W=0 and R=1 ('R' =1 signifying a *read* operation from the SSIU-T). In this case C0, C1 and C2 bit values will be ignored. The SSIU-T will respond as defined in the next paragraph.

BIT response

SSIU-T will respond with BIT results after each BIT request.
The response shall consist of two bytes as defined below. A fault condition is flagged with a logic '1' in the bit location. No fault is represented by a logic '0'.

BYTE 1

BIT POSITION	NAME	NOTE
0	SYNCHRO SHUTDOWN	CAUSED BY +/-15V OR 5V FAULT, OR ANY CHANNEL IN OVER-CURRENT.
1	5v OUT OF RANGE	5V (< 4.5V)
2	3.3V OUT OF RANGE	3.3v (< 3.1v)
3	VIN VOLTAGE OUT OF RANGE	(adjustable with firmware)
4	VIN CURRENT OUT OF RANGE	(adjustable with firmware)
5	CPU FAULT	Internal cpu memory test
6	+15V OUT OF RANGE	+15V (Outside ±10%)
7	-15V OUT OF RANGE	-15V (Outside ±10%)

BYTE 2

BIT POSITION	NAME	NOTE
0	CH1 +15V OVERCURRENT	CURRENT >1A (Adjustable with resistor)
1	CH1 -15V OVERCURRENT	CURRENT >1A (Adjustable with resistor)
2	CH2 +15V OVERCURRENT	CURRENT >1A (Adjustable with resistor)
3	CH2 -15V OVERCURRENT	CURRENT >1A (Adjustable with resistor)
4	CH3 +15V OVERCURRENT	CURRENT >1A (Adjustable with resistor)
5	CH3 -15V OVERCURRENT	CURRENT >1A (Adjustable with resistor)
6	CH4 +15V OVERCURRENT	CURRENT >1A (Adjustable with resistor)
7	CH4 -15V OVERCURRENT	CURRENT >1A (Adjustable with resistor)

BIT OUTPUT DISCRETE

The BIT output discrete is a GND/Open type and needs to be pulled up on the host side.
When no fault is sensed, the output is in the GROUND state. When a fault occurs, the line is opened.
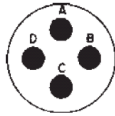There are options available such as 28v/Open type, latched or dynamic operation of the discrete.
Please contact Kimdu Support for details.

Connector Definitions :

Connector Type: MIL-C-26482 Series 2

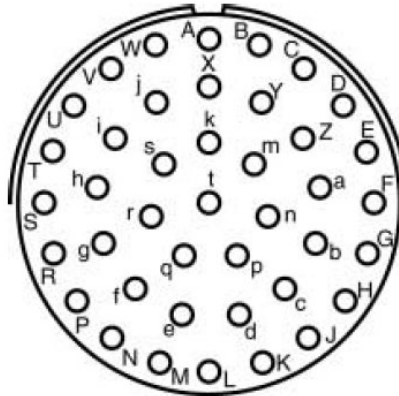| J2 – SIGNAL I/O		
PIN	FUNCTION	
A	RHi	Reference input Hi
B	RLo	Reference input Low
C		Reserved
D	CH1 - S1	Synchro output S1 CH 1
E	CH1 - S2	Synchro output S2 CH 1
F	CH1 - S3	Synchro output S3 CH 1
G		Reserved
H	CH2 - S1	Synchro output S1 CH 2
J	CH2 - S2	Synchro output S2 CH 2
K	CH2 - S3	Synchro output S3 CH 2
L		Reserved
M		Reserved
N	CH3 - S1	Synchro output S1 CH 3
P	CH3 - S2	Synchro output S2 CH 3
R	CH3 - S3	Synchro output S3 CH 3
S		Reserved
T	CH4 - S1	Synchro output S1 CH 4
U	CH4 - S2	Synchro output S2 CH 4
V	CH4 - S3	Synchro output S3 CH 4
W		Reserved
X		Reserved
Y	232 RX	RS-232 RX
Z	232 TX	RS-232 TX
a	232 GND	RS-232 GND
b		Reserved
c	422 TX +	RS-422 TX +
d	422 TX -	RS-422 TX -
e	422 RX +	RS-422 RX +
f	422 RX -	RS-422 RX -
g		Reserved
h		Reserved
i		Reserved
j	BIT	Bit Discrete Output
k	GND	GND
m	232 TX UL	RS-232 TX UPLOAD
n	232 RX UL	RS-232 RX UPLOAD
p	232 UGND	RS-232 GND
q		Reserved
r	GND	GND
s	UL Jumper	UPLOAD (see note 2)
t	GND	GND

J1 - POWER

J2 Connector

14-4

PIN	FUNCTION
A	+28VDC Logic
B	+28vDC Heater *
C	28VDC RTN
D	28VDC Heater RTN *

Mating Connector:
MS3475L14-4S

20-41

Mating Connector:
MS3475L20-41P

* Optional Internal Heaters Power connections. If this option is not ordered, Pin B must be connected to 28vDC and pin D must be connected to 28v RTN.

J2 Mating Connector
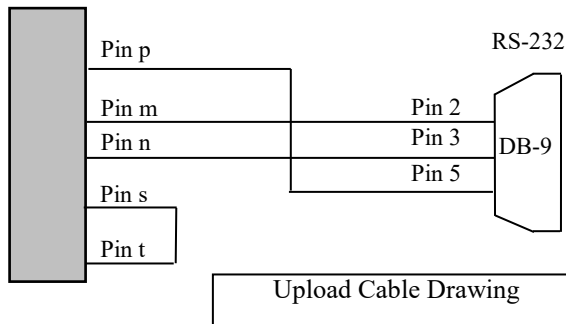
Pin p

Pin m   RS-232

Pin 2
Pin n
Pin 3   DB-9
Pin 5

Pin s

Pin t

Upload Cable Drawing

Notes:
(1) Mating connectors are not included. They can be ordered through Kimdu Corp. Contact us for details.
(2) Pins "s" and "t" must be shorted on the mating connector for the unit to be in the "Upload" mode. For normal, running mode, pin "s" must be left unconnected.

ALL pins labeled GND are *sourced* by the SSIU and should be only used to connect external devices for RS-232 applications, BIT, and Loader function..
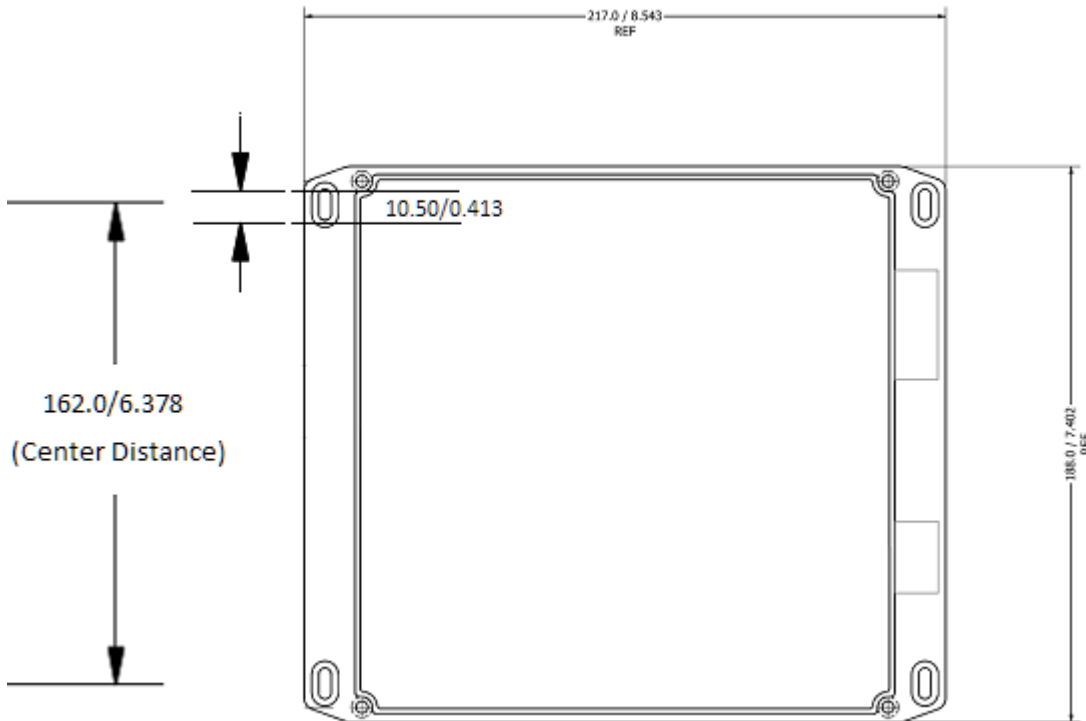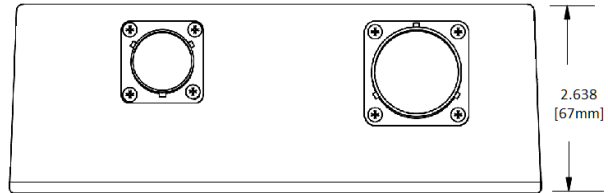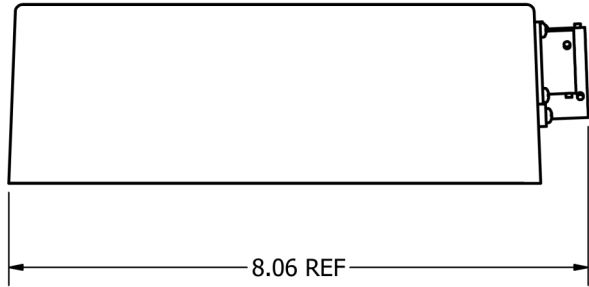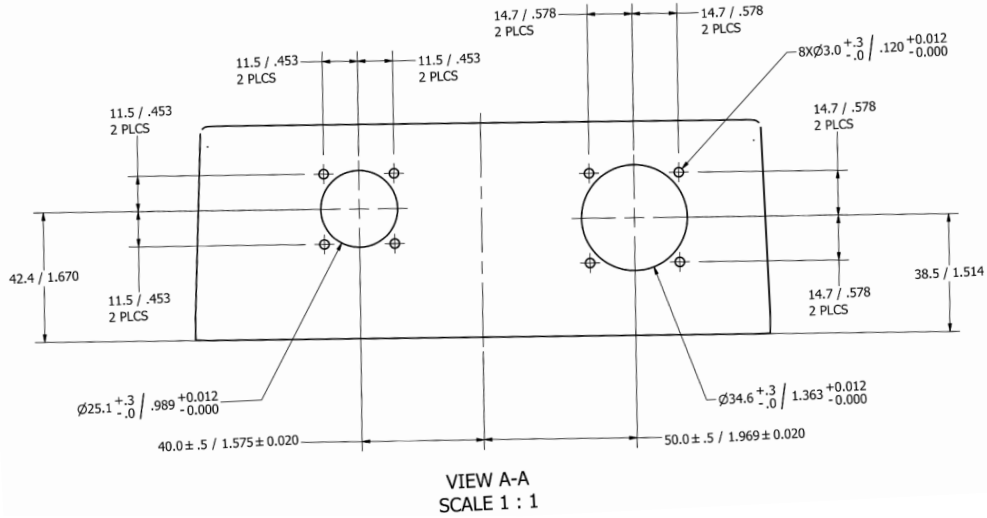
Specifications

Parameter	Value	Units
Synchro Converter Accuracy	±4	Minutes
Synchro Converter output type	Isolated Transformer	
Synchro Output Voltage	90v (11.8v option)	AC
Synchro Output Power (max)	4.5	VA RMS
Output Scale Factor	±3.5	%
Variation with Digital Angle (max)	±0.5	%
Reference Voltage Inputs (RH, RL)	115v @ 400Hz (26v @400 option)	AC
Resolution	16	Bits
Serial Port Baud Rate (default)	921.6	kbaud - see note (1)
Serial Input Type (see ordering p/n)	RS-232 or RS-422	-
Serial Data Format	Proprietary	See Definition
ARINC-429 Data Rate	12.5 or 100	Kbps
Power Supply		
- Nominal DC Input Voltage	28V (nominal) +/-20%	Vdc
- Surge / Voltage Range	per Mil-Std-704E for 28vDC operation	
- 28v Supply Current (Nom) 3-Channel With Reference Voltage, no load	<600	mA
- 28v Supply Current (Nom) 4-Channel With Reference Voltage, no load	<850	mA
- Optional Heater Supply Current (Max) Note: When operating <-40°c	1.5	A
- Reference Voltage Current	< 10	ma
- EMI	Designed to meet Mil-461D	
Enclosure		
- Environmental	IP68	
- Weight (with 3 Synchro Channels);	2110	gm
Connectors		
- Type	MIL-C-26482	
Operating Temperature	-40 to +71 (see note 3)	°C
Storage Temperature	-55 to +125	°C

Notes:
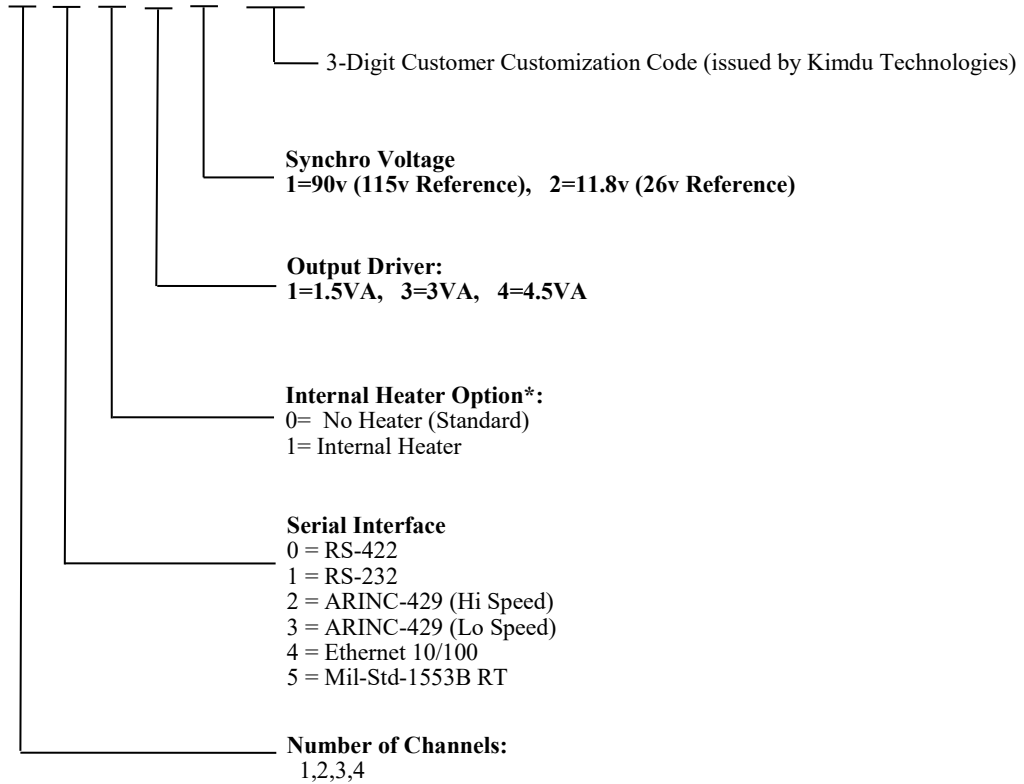(1)   Other rates can be supplied.
(2)   Weight based on internal heatsinks for higher power operation (> 1.5VA).
(3)   Operating temperature can operate below -40c with optional internal heaters. Contact factory.

Mechanical Drawings

14.7 / .578
2 PLCS

14.7 / .578
2 PLCS

8XØ3.0 $^{+.3}_{-.0}$ / .120 $^{+0.012}_{-0.000}$

11.5 / .453
2 PLCS

11.5 / .453
2 PLCS

14.7 / .578
2 PLCS

11.5 / .453
2 PLCS

42.4 / 1.670

38.5 / 1.514

11.5 / .453
2 PLCS

14.7 / .578
2 PLCS

Ø25.1 $^{+.3}_{-.0}$ / .989 $^{+0.012}_{-0.000}$

Ø34.6 $^{+.3}_{-.0}$ / 1.363 $^{+0.012}_{-0.000}$

40.0 ± .5 / 1.575 ± 0.020

50.0 ± .5 / 1.969 ± 0.020

VIEW A-A
SCALE 1 : 1

2.638
[67mm]

8.06 REF

217.0 / 8.543
REF

10.50/0.413

162.0/6.378
(Center Distance)

188.0 / 7.402
REF

Ordering Information

SSIU-T- X - X - X - X - X - Dxxx

3-Digit Customer Customization Code (issued by Kimdu Technologies)

Synchro Voltage
1=90v (115v Reference),   2=11.8v (26v Reference)

Output Driver:
1=1.5VA,   3=3VA,   4=4.5VA

Internal Heater Option*:
0= No Heater (Standard)
1= Internal Heater

Serial Interface
0 = RS-422
1 = RS-232
2 = ARINC-429 (Hi Speed)
3 = ARINC-429 (Lo Speed)
4 = Ethernet 10/100
5 = Mil-Std-1553B RT

Number of Channels:
 1,2,3,4

Internal Heater Option*:

This option allows the unit to operate at temperatures below -40°c. This option uses a snap-action thermostat switch which is set to close and power the optional internal heaters when the chassis temperature falls below -35°C.

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