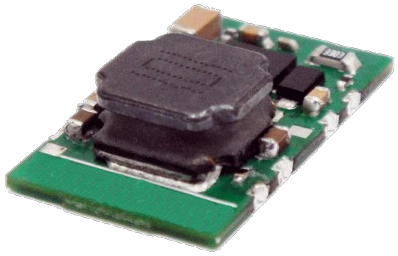
DC-DC Converter
SSVRH-0.5 Series

0.5A Output Current, Non-Isolated DC/DC converter



Features

- SMD-Package, Full SMD Technology
- Adjustable Output Voltage
- Continuous Short Circuit Protection
- Remote ON/OFF Control
- Excellent Line / Load Regulation
- Efficiency Up to 92%
- High Voltage Input range, up to 72V

The SSVRH-0.5 series is a family of cost effective 1.65~6.0W single output buck DC-DC converters. These converters achieve low cost and small SMD package, output voltage adjustment, remote ON/OFF control, continuous short circuit protection with automatic restart, good line / load regulation and ultra low quiescence current. Input voltages of 9~72, 14~72, 17~72 and 21~72 with output voltage of 3.3, 5, 6.5, 7.2, 9, 12 and 15Vdc. High performance features include high efficiency operation up to 92%.

All specifications typical at Ta=25°C, nominal input voltage and full load unless otherwise specified.

OUTPUT SPECIFICATIONS

Voltage Accuracy	±2%, max.
Output voltage adjustability (Trim)	±10%, max.
Output Current (Full Load)	See table, max.
Line regulation	±1%, max.
Load regulation	±1%, max.
Ripple & Noise (1)	75mVpk-pk, max.
Short Circuit Protection	Continuous (Automatic Recovery)
Temperature coefficient	±0.02%/°C
Capacitor Load(2)	See table, max.
Transient Recovery Time(3)	250μs, typ.
Transient Response Deviation(3)	±3%, max.

INPUT SPECIFICATIONS

Input Voltage Range	See table
Start up Time (Nominal Vin and constant resistive load)	10mS, typ.
Input Current (No-Load)	See table, typ.
Input Current (Full-Load)	See table, typ.
Input Filter	Capacitors
Input Reflected Ripple Current(4)	35mApk-pk, typ.
Remote ON/OFF CTRL (pin10)(5)	
ON:	open circuit
OFF:	short circuit CTRL(pin10) and GND
OFF Idle current:	1mA,max.

ABSOLUTE MAXIMUM RATINGS(6)

These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.	
Input Surge Voltage (100mS)	75Vdc,max.
Soldering Temperature (1.5mm from case 10sec max.)	260°C, max.
CTRL (pin10) to GND	5V, max.

GENERAL SPECIFICATIONS

Efficiency	See table, typ.
Switching Frequency(7) (See the Curve)	150k~550kHz, typ.
Humidity	95% rel H
Reliability Calculated MTBF(MIL-HDBK-217 F)	>4.8Mhrs
Safety Standard (design to meet)	IEC/EN 60950-1,62368-1

ENVIRONMENT SPECIFICATIONS

Operating Temperature	-40°C~ +105°C(See Derating Curve) -40°C ~ +60°C(For 100% Load)
Storage Temperature	-55°C ~ +125°C
Cooling(8)	Nature Convection
Lead-free Reflow Solder Process	IPC/JEDEC J-STD-020D.1
Reflow Temperature	Peak 245°C(10 sec),max.
Moisture Sensitivity Level (MSL) IPC/JEDEC J-STD-020D.1	Level 1
Vibration	MIL-STD-810F

PHYSICAL SPECIFICATIONS

Weight	1.8g, typ.
Dimensions	0.77"x0.47"x0.20"

EMC CHARACTERISTICS

Radiated Emissions(9)	EN55032	CLASS B
Conducted Emissions(9)	EN55032	CLASS B
ESD	IEC61000-4-2	Perf. Criteria A
RS	IEC61000-4-3	Perf. Criteria A
EFT(10)	IEC61000-4-4	Perf. Criteria A
Surge(10)	IEC61000-4-5	Perf. Criteria A
CS	IEC61000-4-6	Perf. Criteria A
PFMF	IEC61000-4-8	Perf. Criteria A

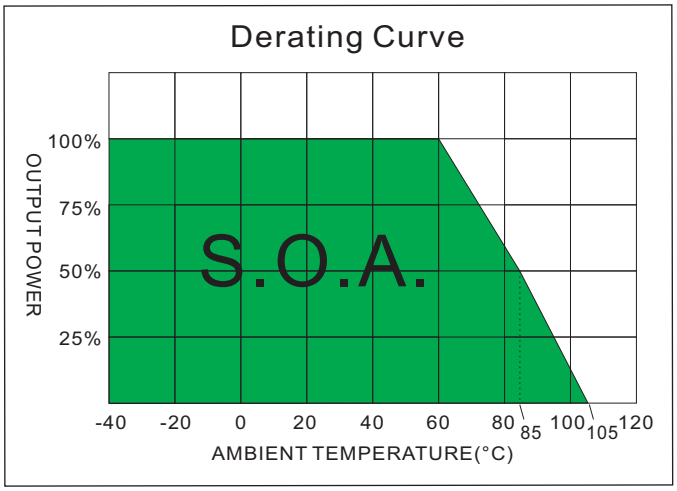
NOTE

1. Measured with a 0.1μF ceramic capacitor & 10μF electrolytic capacitor. The Scope measurement bandwidth is 0-20MHz.
2. Tested by Input Vin Range and constant resistive load.
   Operation under no-load & light load may not meet all specifications.
3. Tested by normal Vin and 25% load step change (100%-75% of Iout).
4. Input reflected ripple current is measured through a source inductor L1(12μH) and a source capacitor C1=10μF at nominal input and full load.
5. The remote on/off control pin is referenced to GND.
6. Do not operate the unit(s) exceeding the absolute maximum rating, over rating causes damage to the units.
7. The switching frequency is different according to output voltage models.
8. "Nature Convection" is usually about 30-65 LFM but is not equal to still air (0 LFM).
9. The SSVRH-0.5 series can meet EN55032 Class B with an external filter in parallel with the input pins.
10. An external filter capacitor and TVS is required if the module has to meet IEC61000-4-4 & IEC61000-4-5.
    The filter capacitor and TVS suggest: Nippon - chemi - con KY series , 330uF/100V and TVS , 3KW , 70V.

PART NUMBER STRUCTURE

SSVR H - 48 05 - 0.5 R

- **Series Name**: High Voltage input range
- **Input Voltage Range**: 48 - 9~72V; - 14~72V; - 17~72V; - 21~72V
- **Output Voltage**: **3R3** - 3.3V; **05** - 5V; **6R5** - 6.5V; **7R2** - 7.2V; **09** - 9V; **12** - 12V; **15** - 15V
- **Output Current**: **0.5** - 0.5A
- **Packing Options**: **"blank"** - standard Tube packing; **R** - for tape & reel packing



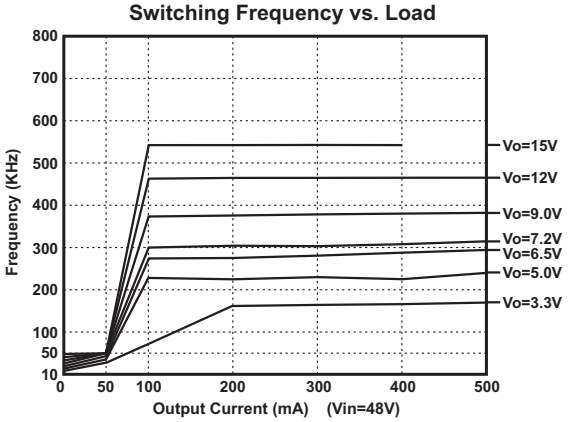
MODEL SELECTION GUIDE

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current (mA) No-Load (max.)	INPUT Current (mA) Full Load Vin(min.)	INPUT Current (mA) Full Load Vin(max.)	OUTPUT Voltage (Vdc)	OUTPUT Current (mA)	EFFICIENCY Vin (min.) @FL(%)	EFFICIENCY Vin (max.) @FL(%)	Capacitor Load (μF, max.)
SSVRH-483R3-0.5	48 (9 - 72)	3	232	33	3.3	500	79	70	100
SSVRH-4805-0.5	48 (9 - 72)	3	323	47	5	500	86	74	100
SSVRH-486R5-0.5	48 (9 - 72)	3	406	58	6.5	500	89	78	100
SSVRH-487R2-0.5	48 (14 - 72)	3	289	62	7.2	500	89	81	100
SSVRH-4809-0.5	48 (14 - 72)	3	357	74	9	500	90	84	100
SSVRH-4812-0.5	48 (17 - 72)	3	384	97	12	500	92	86	100
SSVRH-4815-0.5	48 (21 - 72)	3	311	99	15	400	92	84	100

TYPICAL OPERATING CONDITIONS

Switching Frequency

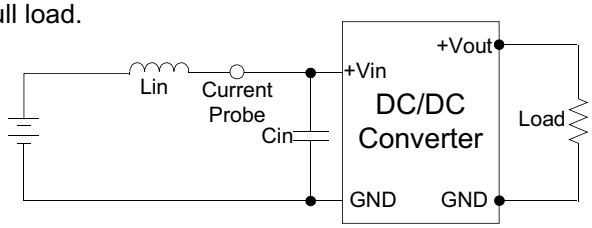
The switching frequency is different according to output voltage models.



TEST CONFIGURATIONS

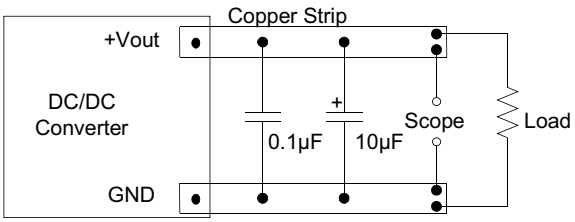
Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through a source inductor Lin(12μH) and a source capacitor Cin(10μF, ESR<1.0Ω at 100kHz) at nominal input and full load.



Output Ripple & Noise Measurement Test

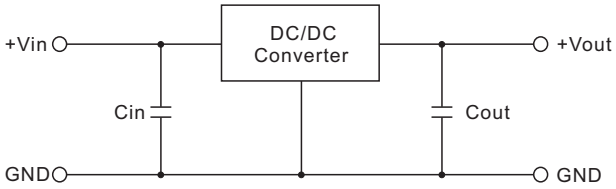
Measured with a 0.1μF ceramic capacitor & 10μF electrolytic capacitor.
The Scope measurement bandwidth is 0-20MHz.



DESIGN CONFIGURATIONS

Standard Application Circuit

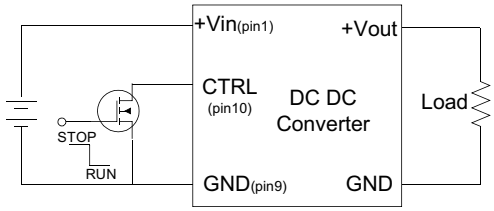
1.Cin is required and must be connected close to the pin terminal of the module.(Cin=10μF)
2.Cout=10μF(Optional)



Remote ON / OFF Test Step

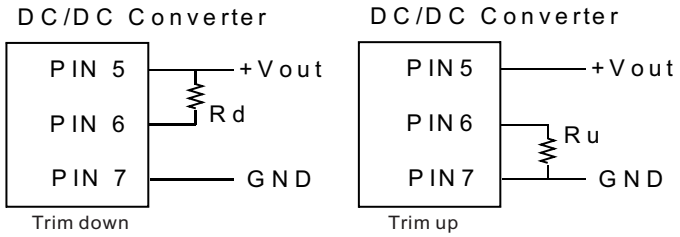
Open circuit , Converter ON.
Short circuit CTRL(pin10) and GND , Converter OFF.

Typical Application Circuit SCHMID-M suggest:



Output Voltage Adjustment

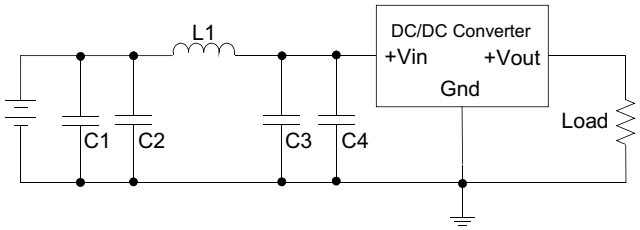
Pin 6 via a resistor to +Vout(pin5), Vo trim down.
Pin 6 via a resistor to GND(pin7),Vo trim up.



EMC COUNTERMEASURES

EMI Countermeasures

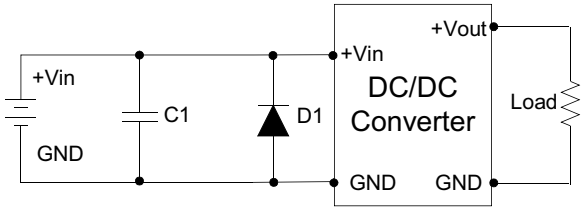
Input filter components (C1, C2, L1, C3, C4) are used to help meet EMI requirement for the module. These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



	C1 & C2	L1	C3 & C4
SSVRH-XY-0.5R	1206 2.2uF/100V	56uH	1206 2.2uF/100V

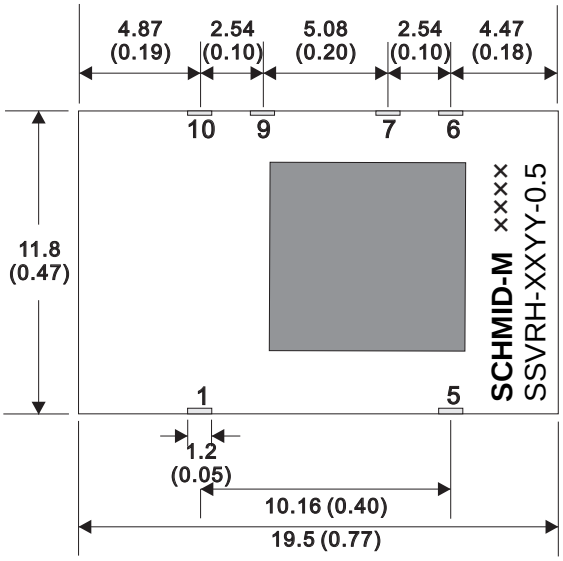
EFT & Surge Test Countermeasures

The filter SCHMID-M suggest: Nippon - chemi - con KY series, 300uF/100V and TVS, 3KW, 70V

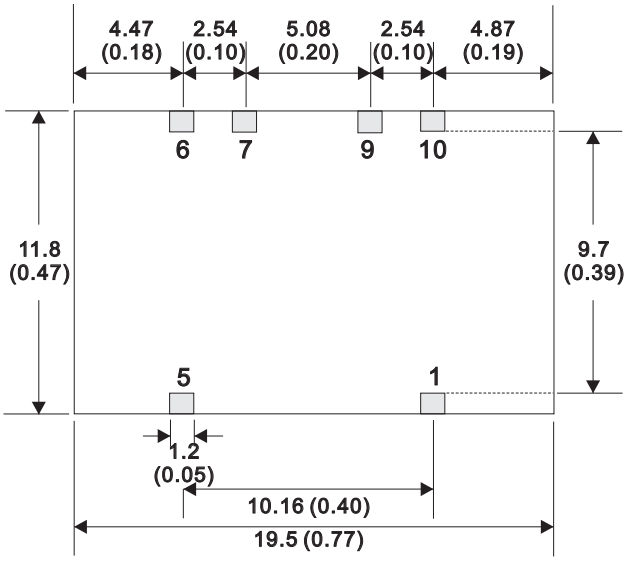


	C1	D1
SSVRH-XY-0.5R	330uF/100V	SMDJ70A

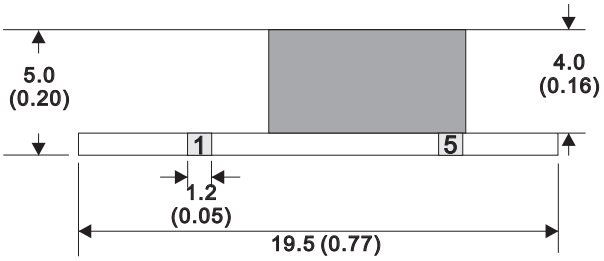
MECHANICAL SPECIFICATIONS



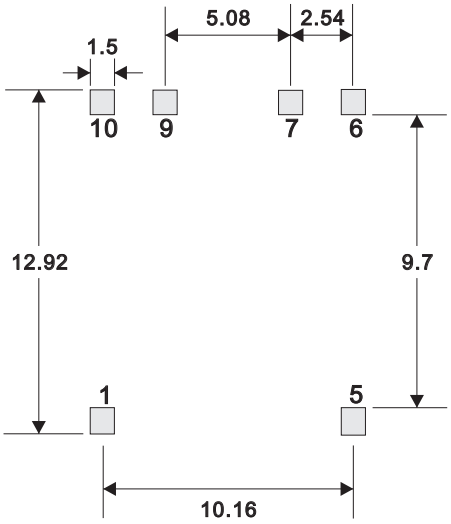
Top view



Bottom view



Side view



Solder Pad Dimension

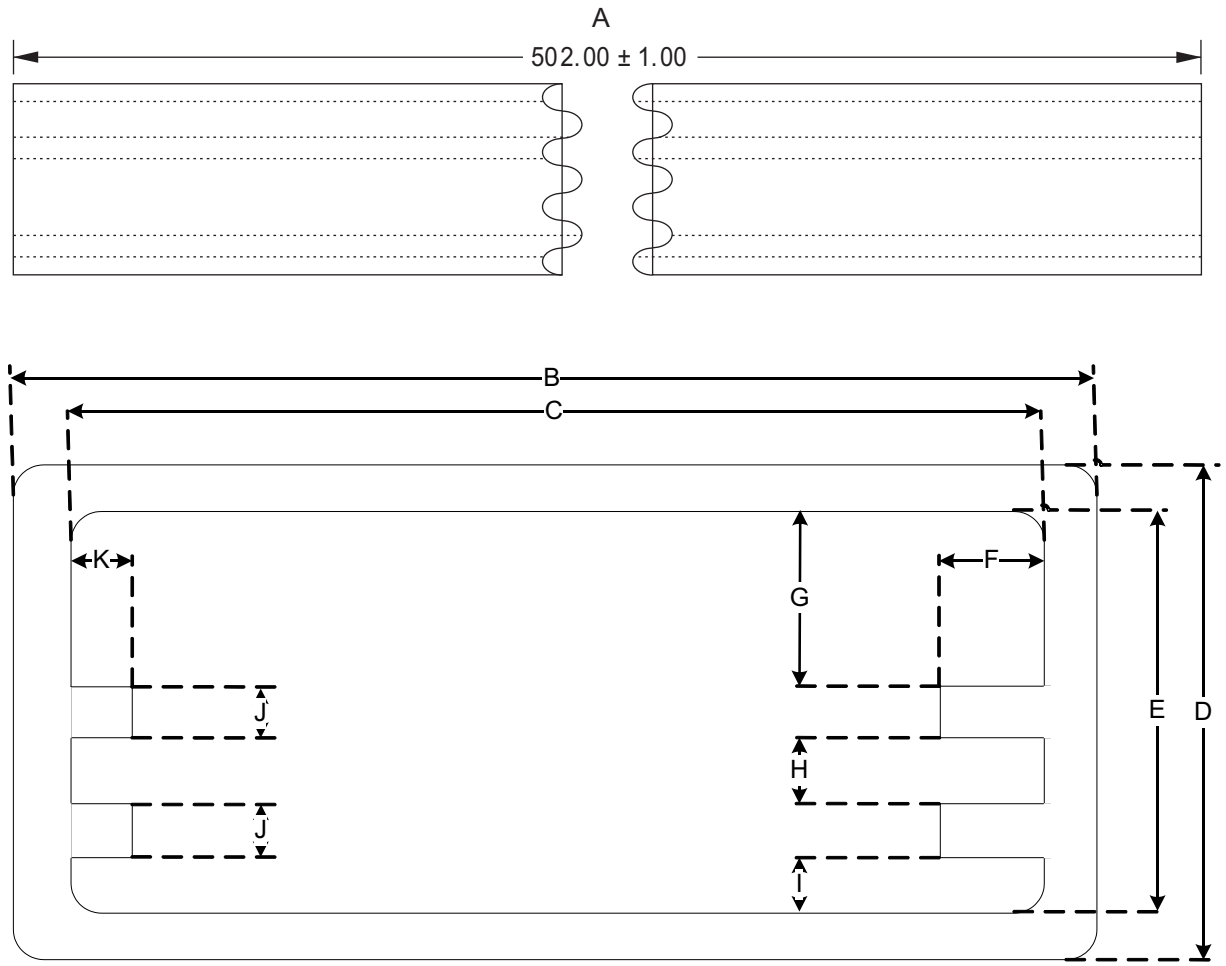
PIN CONNECTIONS	
PIN NUMBER	SINGLE
1	+ V Input
5	+V Output
6	Trim
7	GND
9	GND
10	CTRL

SMD 10Pin Package

Notes : All dimensions are typical in millimeters (inches).
1. Pin pitch tolerances: ±0.25 (±0.01)
2. Pin profile tolerance: ±0.1 (±0.004)
3. Other tolerances: ±0.5 (±0.02)

Tube dimension

Standard packing - Tube
■ 1 Tube contains 40 converters

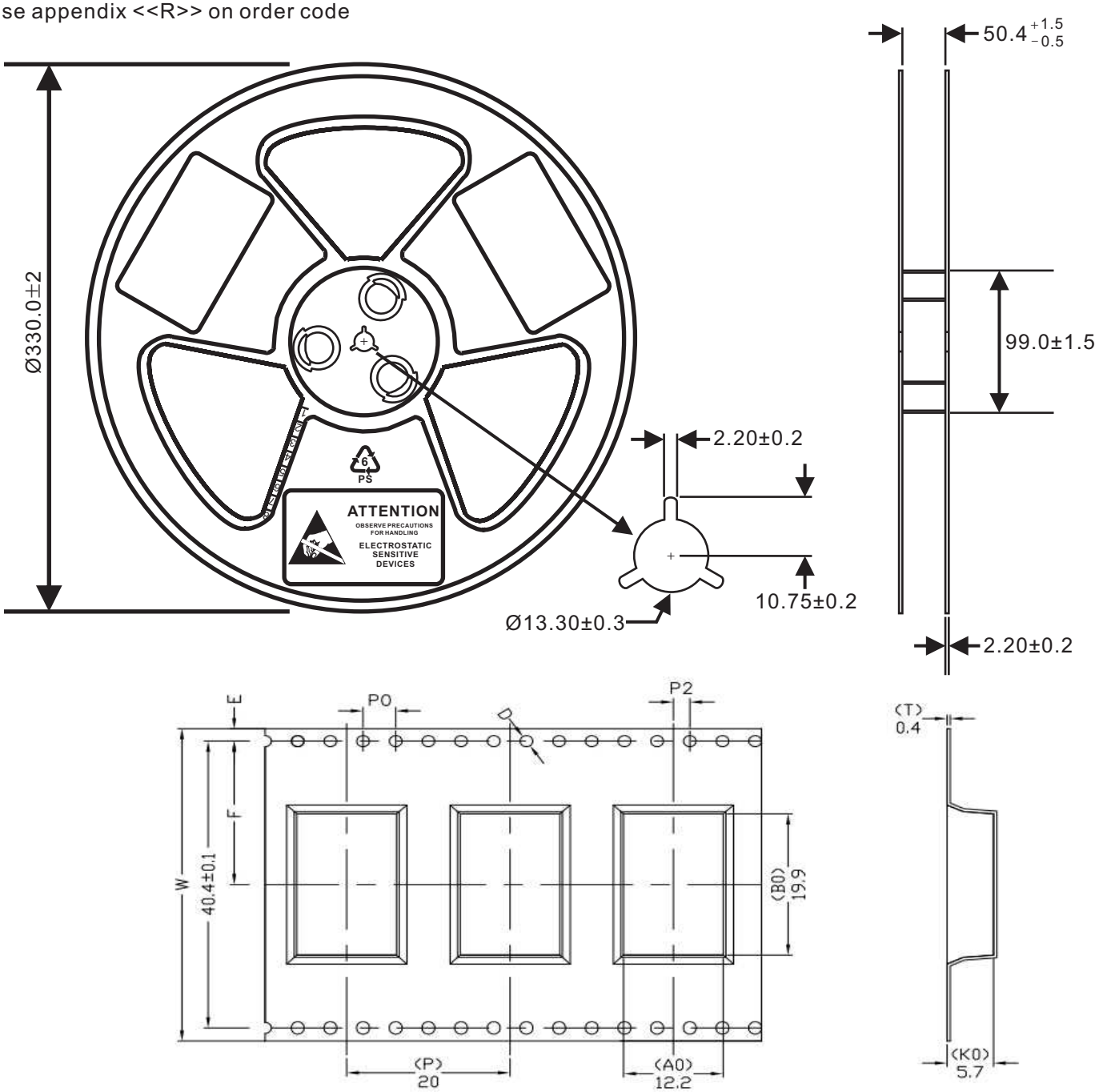


dimensions in [mm]

Tube Length : 502 ± 1.0 mm														
ITEM	A		B		C		D		E		F		G	
DIM	502	+1.0 -1.0	22	+0.25 -0.25	20	+0.25 -0.25	9.7	+0.25 -0.25	7.9	+0.25 -0.25	2	+0.1 -0.1	3.5	+0.1 -0.1
ITEM	H		I		J		K							
DIM	1.3	+0.1 -0.1	1.1	+0.1 -0.1	1.0	+0.1 -0.1	1.2	+0.1 -0.1						

Tape & Reel dimension

Optional packing - Tape & Reel
- Specifications shall conform with current EIA-481 standard
- 1 Reel contains 500 converters
- Use appendix <<R>> on order code



dimensions in [mm]

NOTE:
1. Material: Black Polystyrene.
2. Camber not to exceed 1mm in 100mm.
3. 10 sprocket hole pitch cumulative tolerance ±0.2
4. A0 and B0 measured on a plane 0.3mm above the bottom of the pocket.
5. K0 measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Carrier Length: 36M / 22" reel,Q'ty= 500 pcs/13"reel																					
ITEM	W		A0		B0		K0		P		F		E		D		P0		P2	
DIM	44.0	+0.30 -0.30	12.2	+0.30 -0.10	20.0	+0.30 -0.10	5.70	+0.30 -0.10	20.0	+0.10 -0.10	20.2	+0.15 -0.15	1.75	+0.10 -0.10	1.50	+0.10 -0.00	4.00	+0.10 -0.10	2.00	+0.15 -0.15