

CSV RH-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



PART NUMBER STRUCTURE

CSV RH - 48 05 - 0.5 R
(1) (2) (3) (4) (5) (6)

(1) Series

(2) High Voltage Input Range

(3) Input Voltage Range

48 - 9-72 V
- 14-72 V
- 17-72 V
- 21-72 V
*See Table

(4) Output Voltage

3R3 - 3.3 V
05 - 5.0 V
6R5 - 6.5 V
7R2 - 7.2 V
09 - 9.0 V
12 - 12 V
15 - 15 V

(5) Output Current

0.5 - 0.5 A

(6) Packing Options

Blank - Standard Tube packing
R - for Tape & Reel packing

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ALL SPECIFICATIONS ARE TYPICAL AT 25°C, NOMINAL INPUT AND FULL LOAD UNLESS OTHERWISE NOTED

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Model Number	Input Voltage Range (VDC)	Input Current			Output Voltage (VDC)	Output Current Full Load (mA)	Efficiency Full Load (% , typ.)		Capacitive Load @FL (µF , max.)
		No-Load (mA, typ.)	Full Load (mA, typ.)				@Min. Vin	@Max. Vin	
			@Min. Vin	@Max. Vin					
CSV RH -483R3-0.5	48 (9-72)	3	232	33	3.3	500	79	70	100
CSV RH -4805-0.5	48 (9-72)	3	323	47	5	500	86	74	100
CSV RH -486R5-0.5	48 (9-72)	3	406	58	6.5	500	89	78	100
CSV RH -487R2-0.5	48 (14-72)	3	289	62	7.2	500	89	81	100
CSV RH -4809-0.5	48 (14-72)	3	357	74	9	500	90	84	100
CSV RH -4812-0.5	48 (17-72)	3	384	97	12	500	92	86	100
CSV RH -4815-0.5	48 (21-72)	3	311	99	15	400	92	84	100

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INPUT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Filter		Capacitor			
Input Reflected Ripple Current (1)			35		mApk-pk
Start up Time	Nominal Vin and constant resistive load		10		ms
Remote ON/OFF Control (2)	Module ON	Open Circuit			
	Module OFF	Short circuit CTRL (pin 10) and GND			
	OFF idle current			1	mA
Recommended input fuse (slow blow)	CSV RH-483R3-0.5 & CSV RH-487R2-0.5	0.5			A
	CSV RH-4815-0.5 & CSV RH-4805-0.5 & CSV RH-4809-0.5 & CSV RH-4812- 0.5	0.6			
	CSV RH-486R5-0.5	0.63			
Note :					
1. Measured with a simulated source inductance of 12μH and a source capacitor Cin (10μF, ESR<1.0Ω at 100kHz).					
2. The remote ON/OFF control pin is referenced to GND.					

OUTPUT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		-2.0		+2.0	%
Output Voltage Adjustability (Trim)		-10		+10	%
Maximum Output Current		See Table			
Line Regulation		-1		+1	%
Load Regulation		-1		+1	%
Ripple & Noise (1)	20MHz bandwidth			75	mVpk-pk
Short Circuit Protection		Continuous (Automatic Recovery)			
Temperature Coefficient		-0.02		+0.02	%/°C
Maximum Capacitive Load	Minimum Vin and constant resistive load	See Table			
Transient Recovery Time	Nominal Vin and 25% load step change		250		μs
Transient Response Deviation	(100%-75% of Io)	-3		+3	%
Note :					
1. Ripple & Noise measured with a 0.1μF MLCC and 10μF Electrolytic capacitor.					

ABSOLUTE MAXIMUM RATINGS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (100 ms)				75	VDC
Soldering Temperature	1.5mm from case 10sec max.			260	°C
CTRL (pin 10) to GND				5	V
Note : These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.					

GENERAL SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Switching Frequency (1)	See the Curve	150		550	kHz
MTBF	MIL-HDBK-217 F @ 25°C	4.8			M hours
Safety Standard	IEC / EN / UL 62368-1	Design to meet			
Environmental compliance		RoHS			
Note :					
1. The switching frequency is different according to output voltage models.					

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ENVIRONMENT SPECIFICATIONS

Parameter		Conditions	Min.	Typ.	Max.	Unit
Operating Ambient Temperature		See the Derating Curve	-40		100	°C
Storage Humidity					95	% rel. H
Storage Temperature			-55		125	°C
Thermal Impedance	Mounting at FR4 (3.74*0.98 inch) PCB	CSV RH-483R3-0.5 & CSV RH-4805-0.5	34.56			°C/W
		CSV RH-486R5-0.5 & CSV RH-487R2-0.5 & CSV RH-4809-0.5	41.57			
		CSV RH-4812-0.5 & CSV RH-4815-0.5	35.69			
Cooling		Natural Convection	30-65 LFM			
Lead-free Reflow Solder Process		IPC/JEDEC J-STD-020D.1				
Moisture Sensitivity Level (MSL)			Level 1			
Reflow Temperature			Peak 245°C (10 sec) ,max.			
Vibration			MIL-STD-810F			

EMC SPECIFICATIONS

Parameter	Standard	Condition	Criterion
Conducted Emissions	EN55032	with external components	B
Radiated Emissions	EN55032	with external components	B
ESD	IEC 61000-4-2	Air: ±8kV / Indirect: ±4kV	A
RS	IEC 61000-4-3	10V/m	A
EFT	IEC 61000-4-4	±2kV with external components	A
Surge	IEC 61000-4-5	±2kV with external components	A
CS	IEC 61000-4-6	10Vrms	A
PFMF	IEC 61000-4-8	100A/m	A

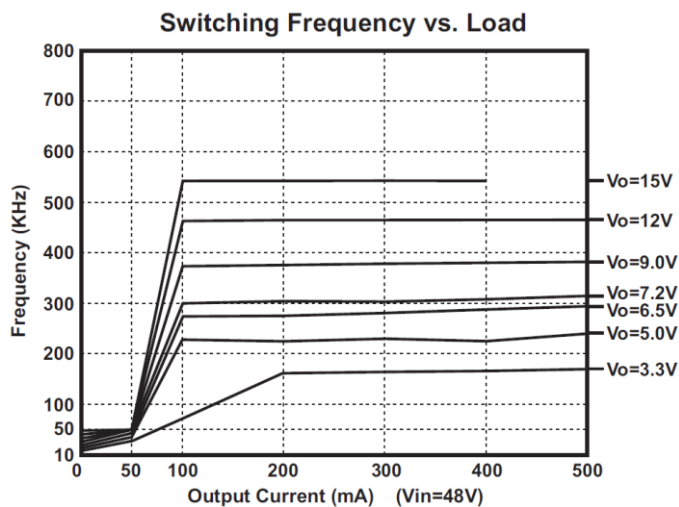
PHYSICAL SPECIFICATIONS

Parameter	Value
Weight	1.8 g, typ.
Dimensions	0.77" x 0.47" x 0.20"

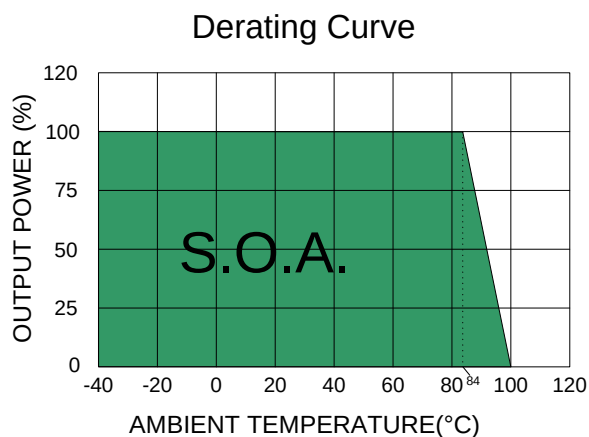
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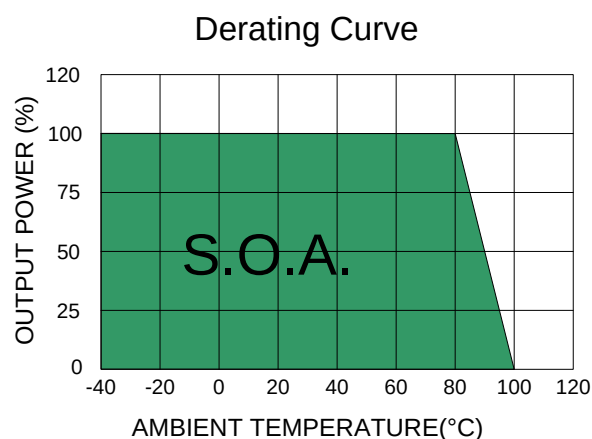
ELECTRICAL CHARACTERISTIC CURVES



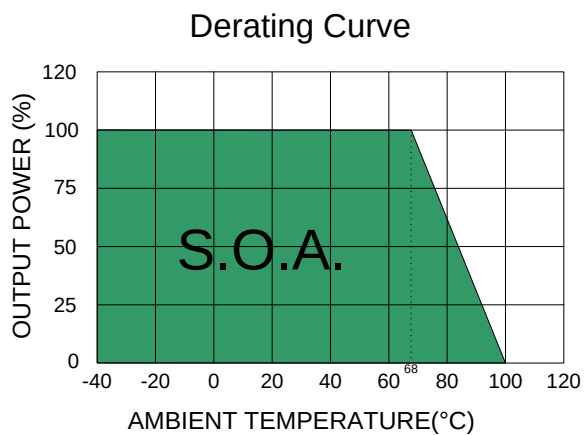
The switching frequency is different according to output voltage models.



CSV RH-483R3-0.5
CSV RH-4805-0.5



CSV RH-486R5-0.5
CSV RH-487R2-0.5
CSV RH-4809-0.5



CSV RH-4812-0.5
CSV RH-4815-0.5

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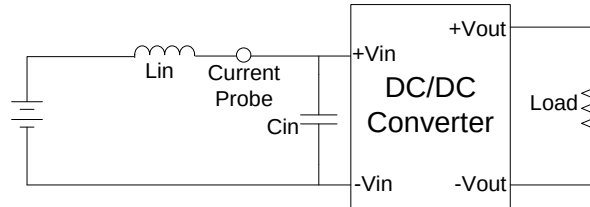
0.5A Output Current, Non-Isolated DC-DC converter



TEST CONFIGURATIONS

Input Reflected Ripple Current Test Step

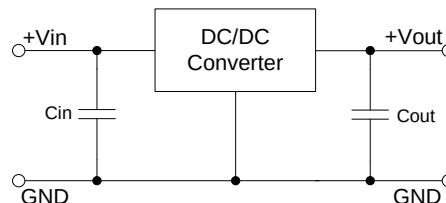
Input reflected ripple current is measured with a source inductor L_{in} ($12\mu H$) and a source capacitor C_{in} ($10\mu F$, $ESR < 1.0\Omega$ at $100kHz$) at nominal input and full load.



DESIGN CONFIGURATIONS

Standard Application Circuit

1. C_{in} is required and must be connected close to the pin terminal of the module. ($C_{in} = 10\mu F$)
2. $C_{out} = 10\mu F$ (Optional)

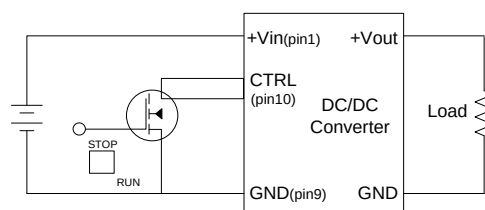


Remote ON / OFF Test Step

Open circuit , Converter ON.

Short circuit CTRL (pin 10) and GND , Converter OFF.

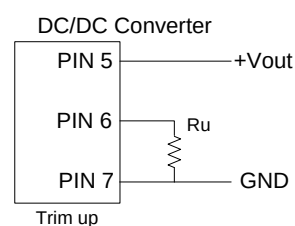
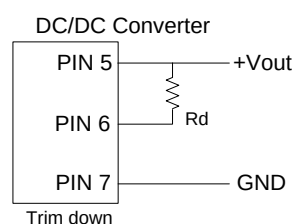
Typical Application Circuit MOTIEN suggest :



Output Voltage Adjustment

Pin 6 via a resistor to Pin 5 (+Vout) , V_o trim down.

Pin 6 via a resistor to Pin 7 (GND) , V_o trim up.



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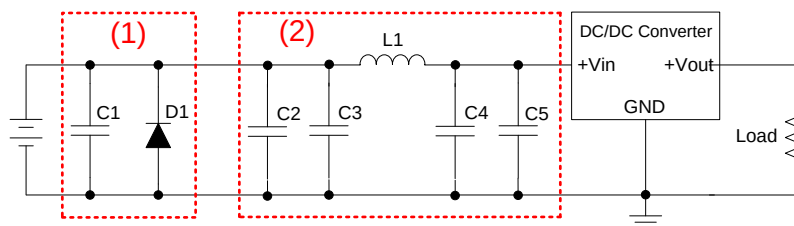
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DESIGN & FEATURE CONFIGURATIONS

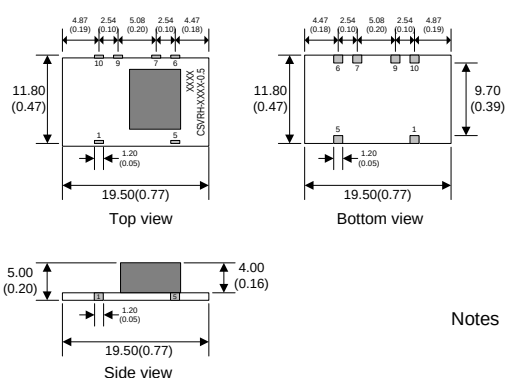
EMC Filter

The part (1) Circuit is used to meet Surge & EFT test, and the part (2) Circuit is used to meet EMI test.



	C1	D1	C2, C3, C4, C5	L1
CSV RH-48XX-0.5	NIPPON Chemi-con KY Series 330μF, 100V	SMDJ70A	MLCC 2.2μF, 100V	56μH

MECHANICAL SPECIFICATIONS



SMD 10Pin Package

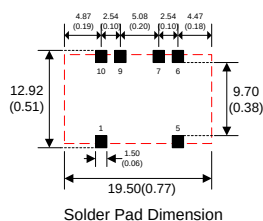
Notes : All dimensions are typical in millimeters (inches).

1. Pin pitch tolerance: ± 0.25 (± 0.01)
2. Pin profile tolerance: ± 0.1 (± 0.004)
3. Other tolerance: ± 0.5 (± 0.02)

PIN CONNECTIONS

PIN NUMBER	SINGLE
1	+Vin
5	+Vout
6	Trim
7	GND
9	GND
10	CTRL

RECOMMENDED FOOTPRINT DETAILS



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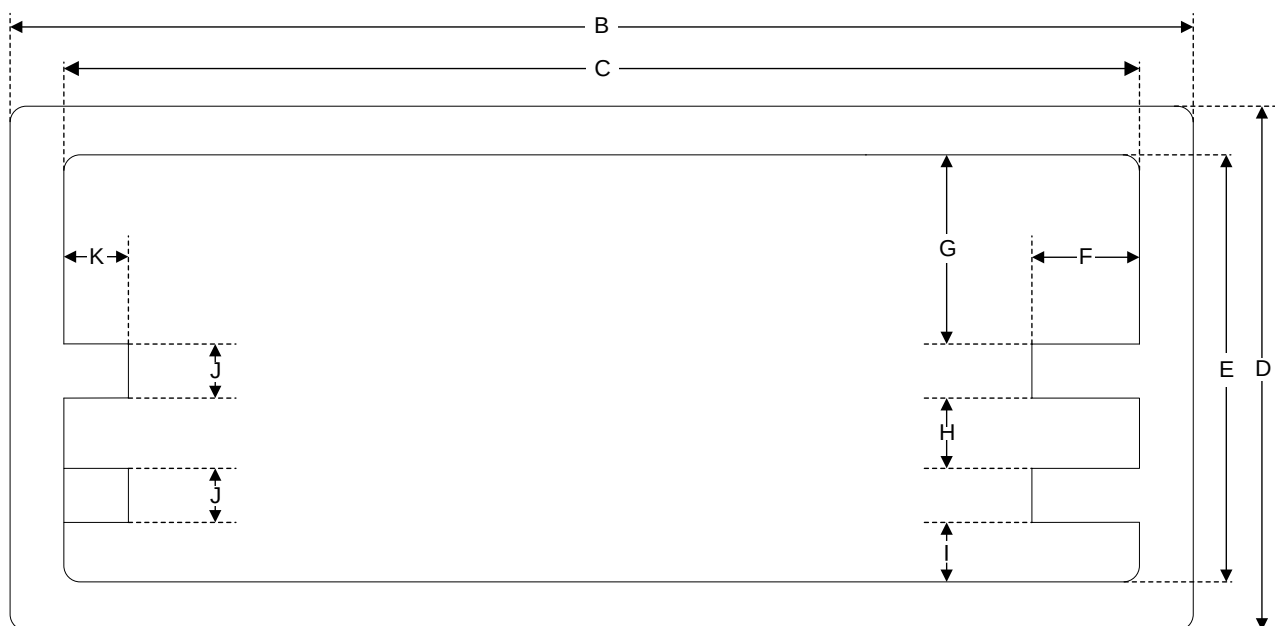
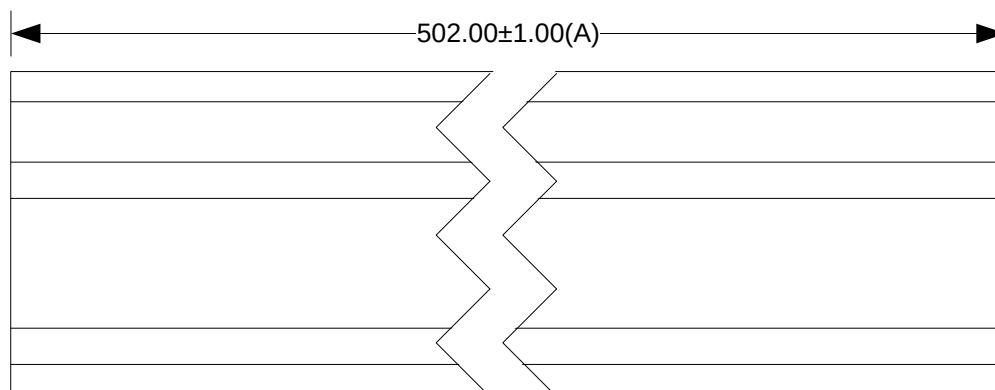
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TUBE DIMENSION

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		H	
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	1.3	+0.1 -0.1

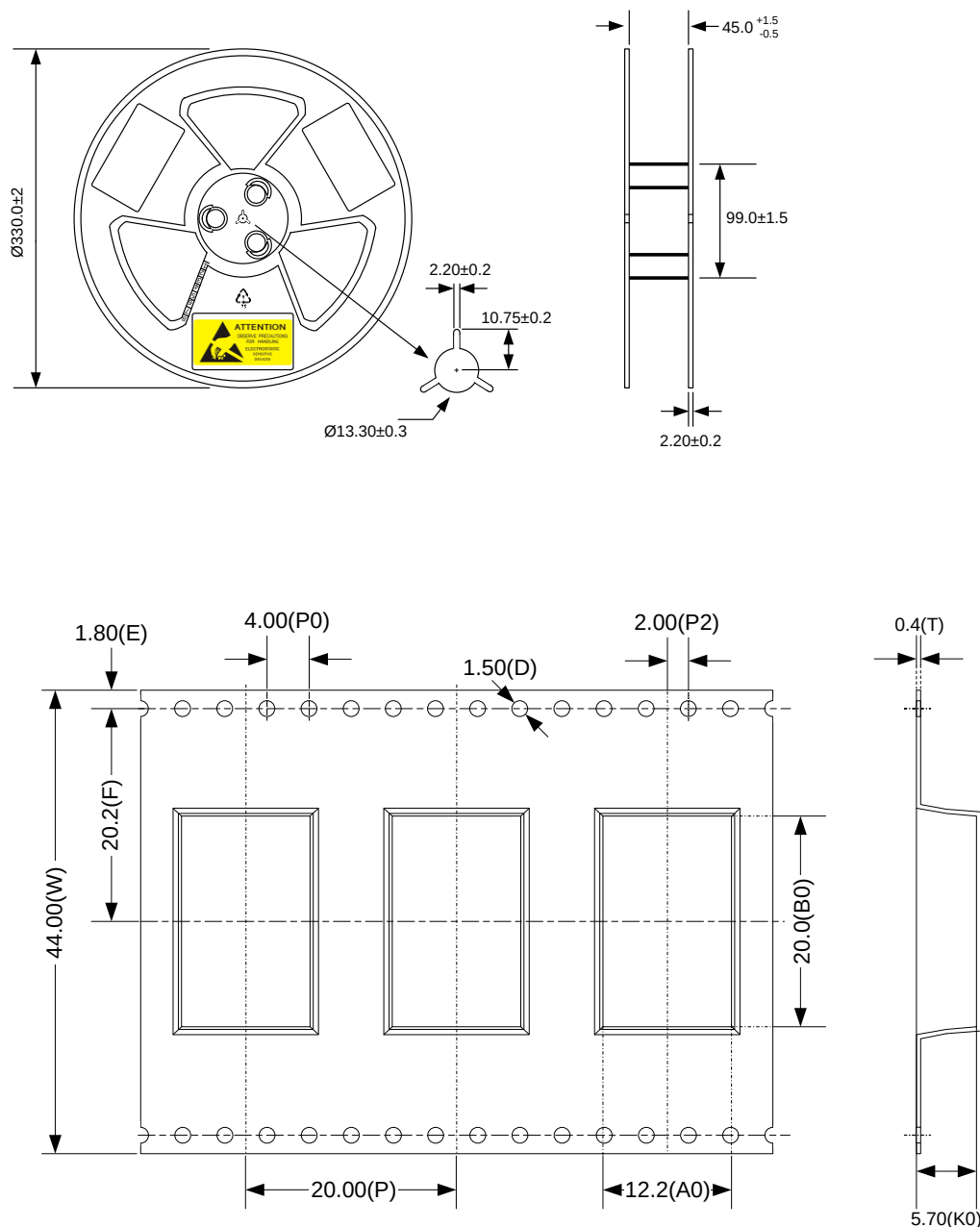
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TAPE & REEL DIMENSION - SINGLE OUTPUT MODELS

Optional packing – Tape & Reel

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



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.

Dimensions in [mm]

Carrier Length: 30M / 22" reel, Q'ty= 500 pcs/13"reel											
ITEM	W		A0		B0		K0		P		
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	
ITEM	F		E		D		P0		P2		
DIM	20.2	+0.15 -0.15	1.80	+0.10 -0.10	1.50	+0.10 -0.00	4.00	+0.10 -0.10	2.00	+0.15 -0.15	