

General Description

The SY205201SSC is a highly integrated common mode filter (CMF) providing both electrostatic discharge (ESD) protection and electromagnetic interference (EMI) common mode noise filtering. It can be used for systems using high-speed differential serial interfaces, such as MIPI D-PHY or HDMI.

SY205201SSC can protect and filter two differential line pairs. The SY205201SSC is available in a small RoHS-compliant WDFN10 package.

Features

- Large Differential Bandwidth > 2.5 GHz
- High Common-Mode Stop Band Attenuation:
 - > 20 dB at 1 GHz
 - ±15kV ESD Protection Per Channel (IEC 61000-4-2 level 4, Contact Discharge)
- Low channel input capacitance ensures superior impedance-matching performance.
- WDFN10 2.50mm×2.00mm×0.75mm Package with 0.50mm Lead Pitch
- RoHS-Compliant, Lead-Free Packaging

Applications

- HDMI/DVI Display in Mobile Phones
- MIPI D-PHY (CSI-2, DSI, etc.) in Mobile Phones and Digital Cameras

Mechanical Characteristics

- DFN 2.5x2.0-10 Package
- Marking: Device Code, Date Code
- Packaging: Tape and Reel

Circuit Diagram

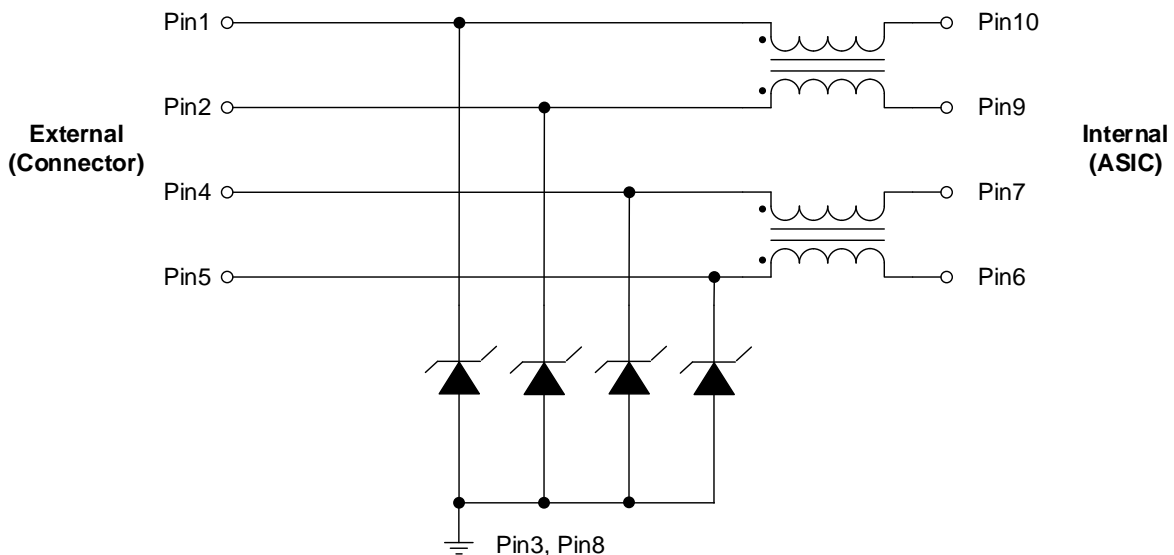
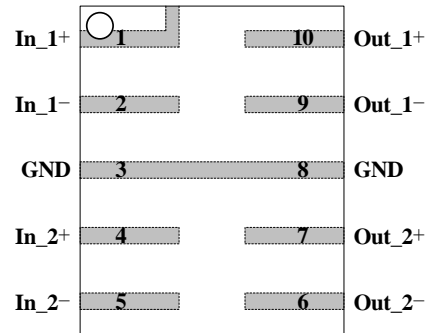


Figure 1. Common Mode Filter with Embedded ESD Protection

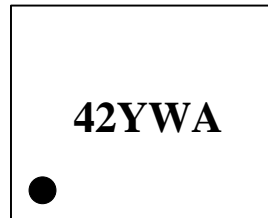
Ordering Information

Part Number	Package Type	Top Mark
SY205201SSC	DFN2.5x2.0-10 RoHS Compliant and Halogen Free	42YWA

Pinout (Top View)



Marking Codes



Note 1: “42” is device code, fixed.

Note 2: “YWA” is date code.

Pin Description

Pin Name	Pin No.	Pin Description
In_1+	1	CMF Channel 1+ to Connector.
In_1-	2	CMF Channel 1- to Connector.
Out_1+	10	CMF Channel 1+ to ASIC.
Out_1-	9	CMF Channel 1- to ASIC.
In_2+	4	CMF Channel 2+ to Connector.
In_2-	5	CMF Channel 2- to Connector.
Out_2+	7	CMF Channel 2+ to ASIC.
Out_2-	6	CMF Channel 2- to ASIC.
GND	3, 8	Ground.

Absolute Maximum Rating				
Parameter	Symbol	Min	Max	Unit
DC Current per Line	I _{DC}		100	mA
DC Package Power Rating	P _{DC}		0.5	Watts
Human Body Model, MIL-STD-883, Method 3015 Contact Discharge per IEC 61000-4-2 Level 4 ^{1,2,3}	V _{ESD}	-30 -15	30 15	kV
Operating Temperature	T _{OPT}	-40	+85	°C
Storage Temperature	T _{STG}	-65	+150	°C

Electrical Characteristics $T_A = 25^\circ\text{C}$						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Channel Resistance	R			3.5	5.0	Ω
Total Channel Capacitance	C_{TOTAL}	At 1.65VDC Reverse Bias; 1MHz, 30mVAC		0.8	1.3	pF
Nominal Reverse Working Voltage	V_{RWM}				5.0	V
Forward Voltage @ I_F	V_F	$I_F = 1\text{mA}$	0.4		1.2	V
Breakdown voltage	V_{BR}	$I_T = 1\text{mA}$	6	8	10	V
Reverse Leakage Current @ V_{RWM}	I_R	$V_{\text{RWM}} = 5\text{V}, T_A = 25^\circ\text{C}$		0.01	0.1	μA
Dynamic Resistance	R_{DYN} ³	Positive Negative		1.36 0.6		Ω
Differential mode Cut-off Frequency at -3dB Attenuation	f_C ³	$Z_{\text{SOURCE}} = 50\Omega, Z_{\text{LOAD}} = 50\Omega$		4.0		GHz
Common Mode Stop Band Attenuation	F_{atten}	@ 900MHz		16		dB
Common Mode Impedance	Z_C	@ 100MHz		32		Ω

Note 1: ESD zapping at I/O pins with respect to GND.

Note 2: Un-zapped pins are floating.

Note 3: Specs are verified by measurements.

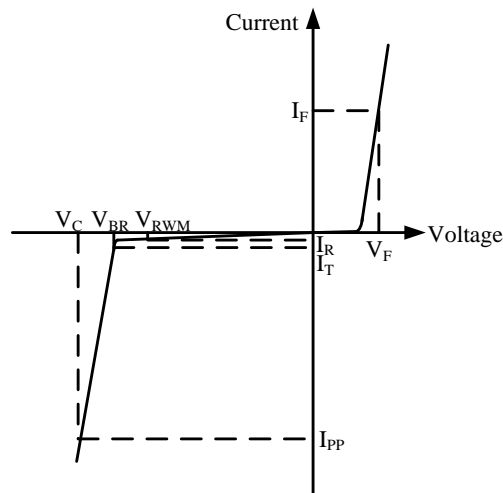
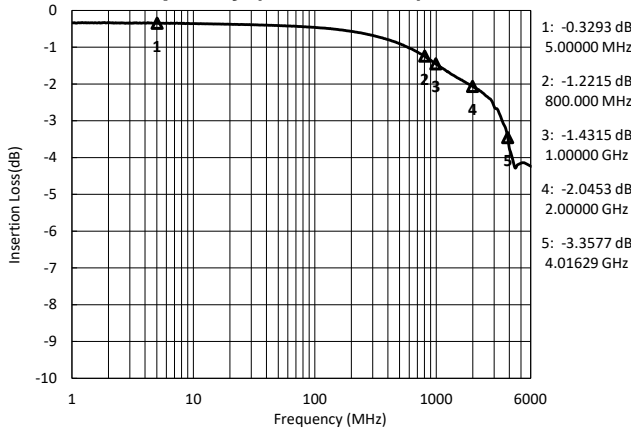


Figure 2. Uni-Directional TVS

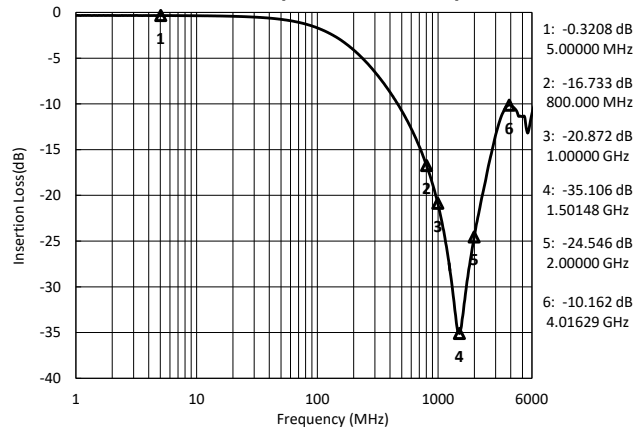
Typical Characteristics

Typical Filter Characteristics ($T_A = 25^\circ\text{C}$, DC Bias = 0V, 50 Ω Environment)

Differential Mode Attenuation SDD21 vs. Frequency ($Z_{diff} = 100\Omega$)

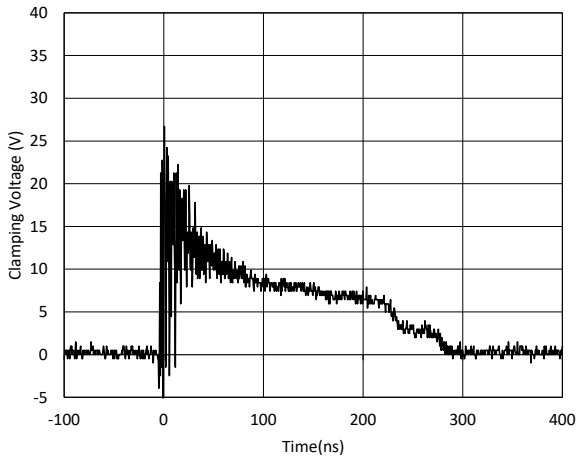


Common Mode Attenuation SCC21 vs. Frequency ($Z_{comm} = 50\Omega$)

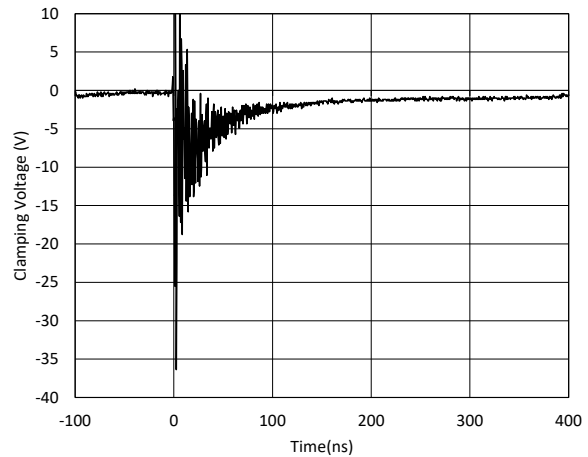


ESD Voltage Clamping Characteristics

ESD Clamping Voltage +8 kV per IEC6100-4-2 (External to Internal Pin)



ESD Clamping Voltage -8 kV per IEC6100-4-2 (External to Internal Pin)



Note 1: The clamping voltage was captured at the internal pin while the ESD pulse struck at the corresponding external pin.

Note 2: The clamping voltage test should be conducted with a 1GHz bandwidth oscilloscope.

Application Information

MIPI Application:

Refer to Figure 3 for the implementation of the SY205201SSC in MIPI applications. Utilize a single SY205201SSC to safeguard the D+, D-, and CLK+/- lines.

HDMI Application:

Refer to Figure 4 for the implementation of the SY205201SSC in HDMI applications. Utilize two SY205201SSC devices to protect the high-speed TMDS lines and CLK+/- lines. Additionally, use one SY205209ABC to provide protection for the remaining control lines.

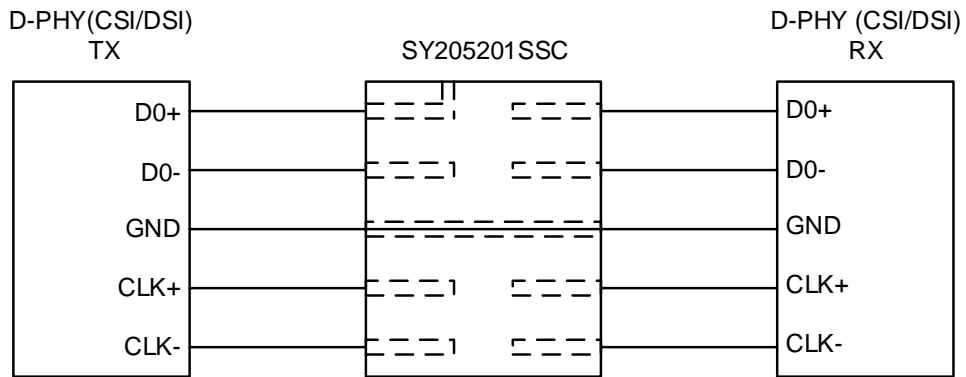


Figure 3. SY205201SSC MIPI D-PHY Application Diagram

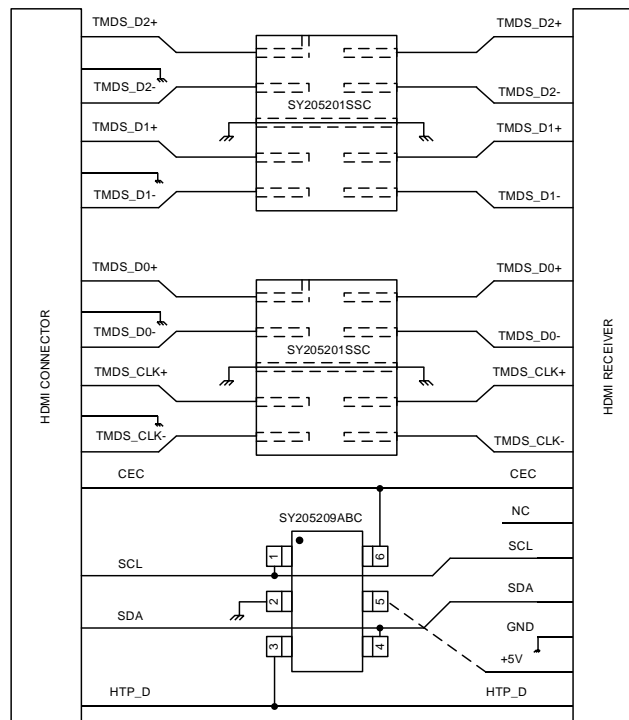


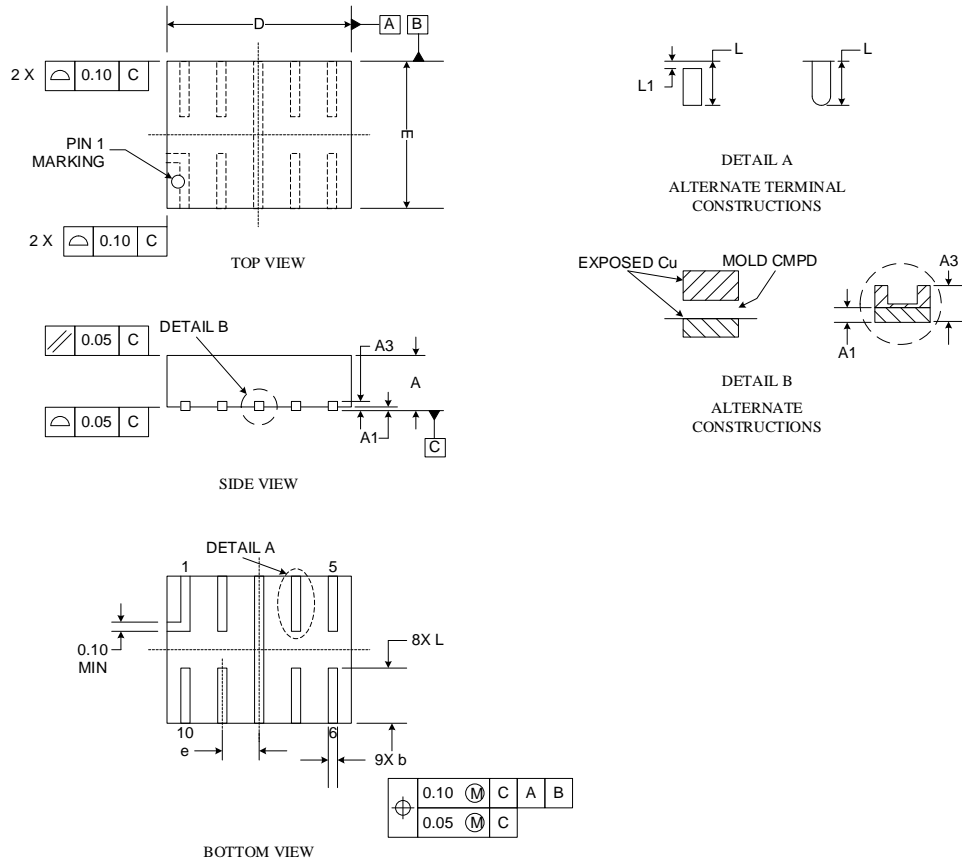
Figure 4. SY205201SSC HDMI Application Diagram

PCB Layout Guidelines

For optimum ESD protection and circuit performance, the following circuit board guidelines are recommended:

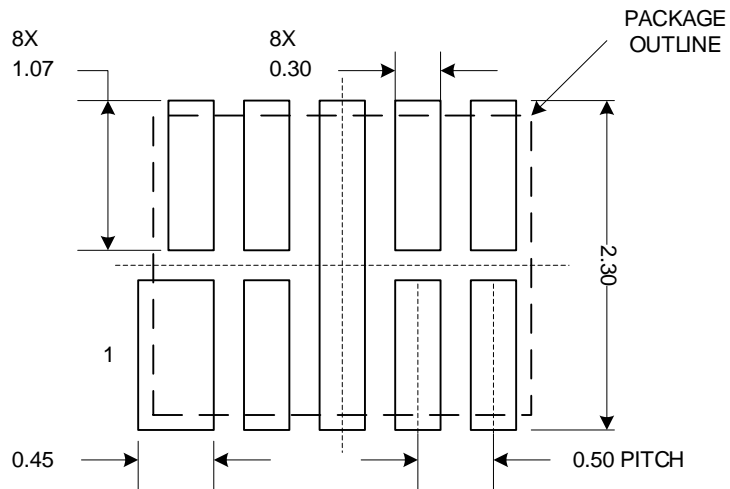
- Place the SY205201SSC as close to the connectors or terminal ports as possible.
- Use a large via to connect the SY205201SSC pin to the ground.
- The SY205201SSC should be placed near the protected line.
- The distance between the SY205201SSC ground pin and the GND reference path should be as short as possible.

WDFN10 DFN2.5x2.0-10 Package Outline Drawing



Package	WDFN10 DFN2.5x1.0-10					
	Millimeters			Inches		
Dim.	Min	Typ	Max	Min	Typ	Max
A	0.70	0.75	0.80	0.028	0.030	0.031
A1	0.00	--	0.05	0.000	--	0.002
A3	0.20 REF			0.008 REF		
b	0.15	0.20	0.25	0.006	0.083	0.010
D	2.45	2.50	2.55	0.096	0.098	0.100
E	1.95	2.00	2.05	0.077	0.079	0.081
e	0.50 BSC			0.020 BSC		
L	0.70	0.80	0.90	0.028	0.031	0.035
L1	0.05	--	0.15	0.002	--	0.006

Recommended Mounting Footprint

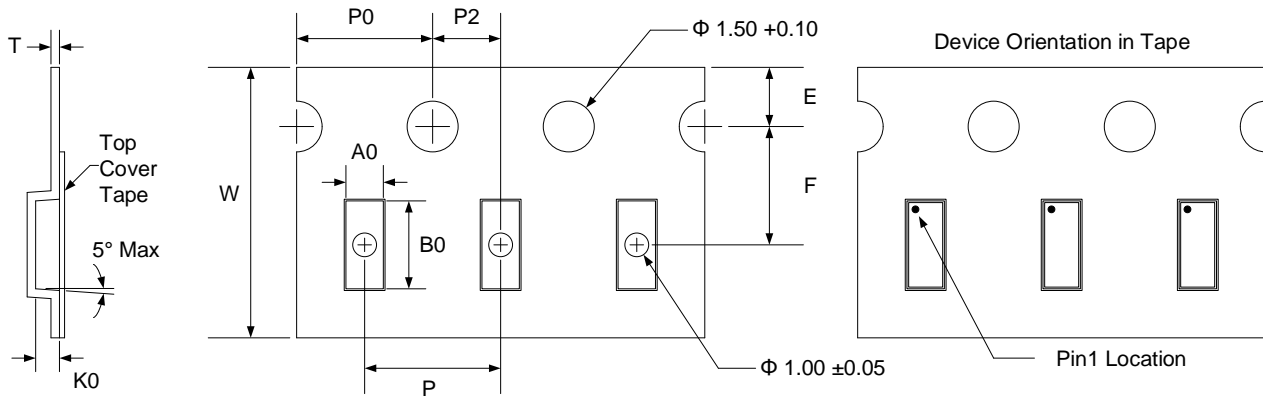


Recommended PCB Layout (Reference only)

Note: All dimensions are in millimeters and exclude mold flash and metal burr.

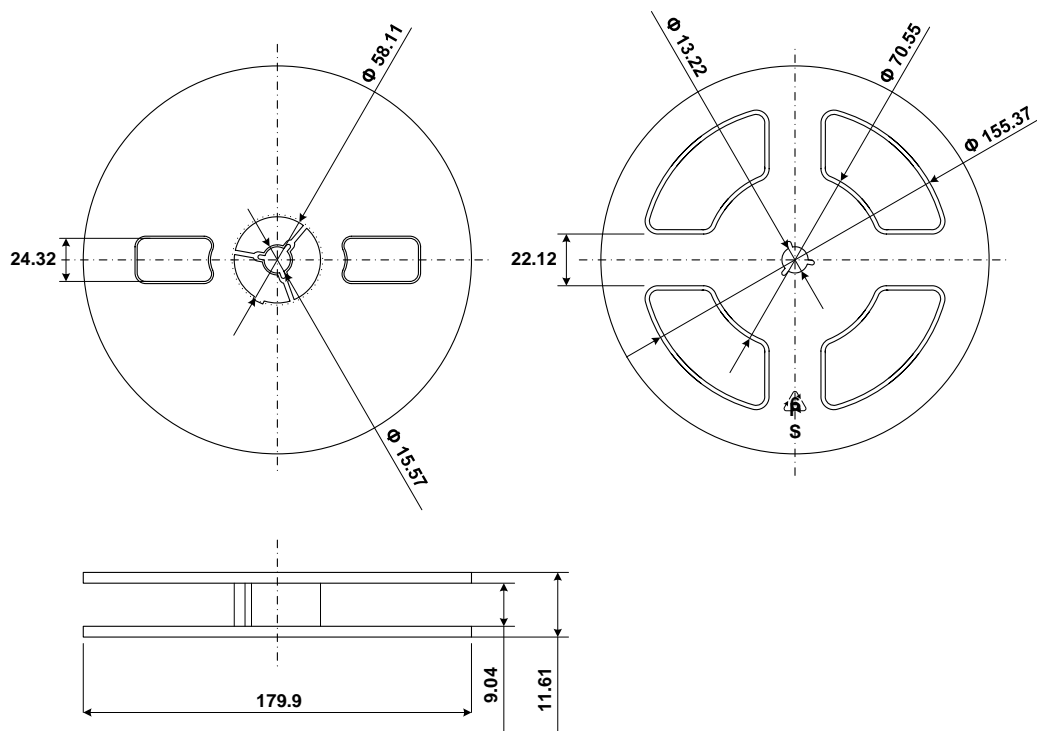
Tape and Reel Specification

Taping Orientation



Symbol	W	A0	B0	K0	E	F	P	P0	P2	T
Dimensions (mm)	8.00+0.30 -0.10	2.19 ± 0.05	2.77 ± 0.05	1.05 ± 0.05	1.75 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	0.25 ± 0.02

Carrier Tape & Reel Specification for Packages



Note: All dimensions are in millimeters.

Package Types	Reel Size (Inch)	Qty per Reel(pcs)
WDFN10 DFN2.5x2.0-10	7"	3000



Revision History

The revision history provided is for informational purposes only and is believed to be accurate; however, it is not warranted. Please make sure that you have the latest revision.

Date	Revision	Change
04/01/2014	Revision 0.9	Initial Release
04/01/2015	Revision 1.0	Production Release

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