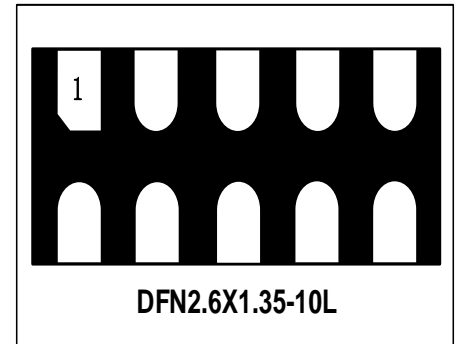


Features

- Two Differential Channels Common-Mode EMI Filter with Integrated ESD Protection
- Large Differential Mode Bandwidth with Cutoff Frequency:4 GHz
- High Common Mode Stop Band Attenuation
- Provides ESD Protection to IEC61000-4-2 Level 4, ± 15 kV Contact Discharge
- Low Channel Input Capacitance Provides Superior Impedance Matching Performance
- Low Channel Resistance: 6.0Ω
- Maximum Package Height: 0.5 mm



IEC COMPATIBILITY (EN61000-4)

- IEC 61000-4-2 (ESD) ± 20 kV (air), ± 15 kV (contact)+
- IEC 61000-4-4 (EFT) 40A (5/50ns)
- IEC 61000-4-5 (Lightning) 4A (8/20 μ s)

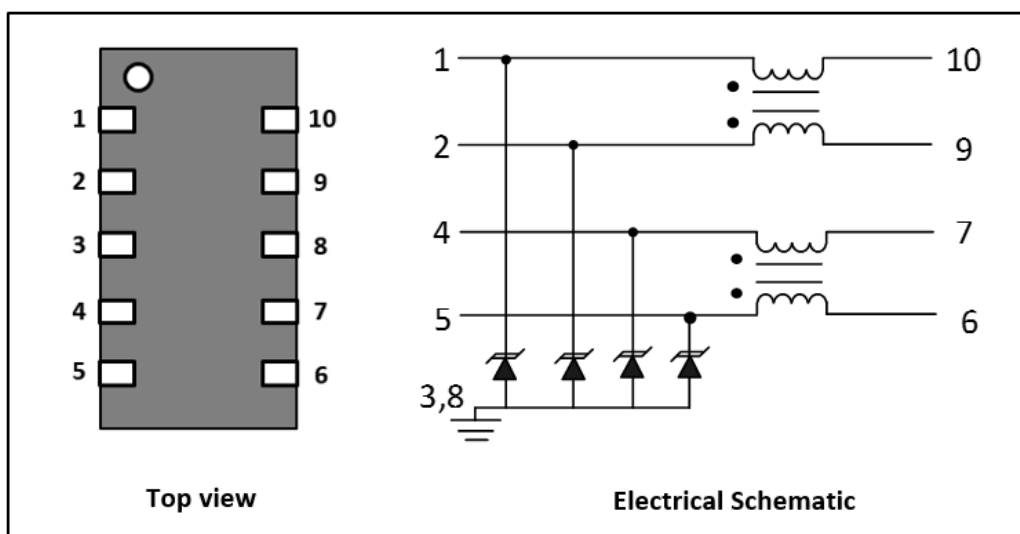
Mechanical Characteristics

- 1.35 x 2.6 mm DFN-10L package
- Pb-Free Package Marking : Marking Code
- Packaging : Tape and Reel per EIA 481
- RoHS Compliant

Applications

- USB 3.0
- HDMI 1.3/1.4/2.0 /DVI Display
- MIPI D-PHY/M-PHY
- eSATA, MHL

Schematic & PIN Configuration



Pin Description

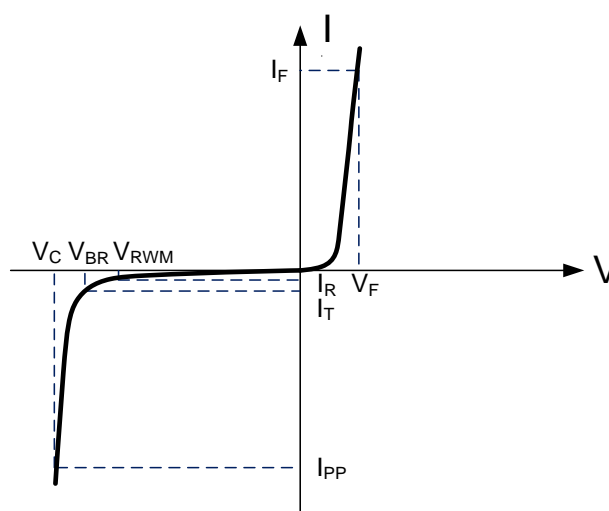
PIN number	Description	PIN number	Description
1	In_1+ (to Connector)	6	Out_2- (to IC)
2	In_1- (to Connector)	7	Out_2+ (to IC)
3	GND	8	GND
4	In_2+ (to Connector)	9	Out_1- (to IC)
5	In_2- (to Connector)	10	Out_1+ (to IC)

Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Power ($t_p = 8/20\mu s$)	P_{PP}	60	Watts
Peak Pulse Current ($t_p = 8/20\mu s$)	I_{PP}	4	A
DC Current per Line	I_{LINE}	100	mA
Operating Temperature	T_J	-55 to + 85	°C
Storage Temperature	T_{STG}	-55 to +150	°C

Electrical Parameters (T=25°C)

Symbol	Parameter
I_{PP}	Reverse Peak Pulse Current
V_C	Clamping Voltage @ I_{PP}
V_{RWM}	Reverse Stand-Off Voltage
I_R	Reverse Leakage Current @ V_{RWM}
V_{BR}	Breakdown Voltage @ I_T
I_T	Test Current
I_F	Forward Current
V_F	Forward Voltage @ I_F



Electrical Characteristics

DWCM5412P						
Parameter	Symbol	Conditions	Min	Typ	Max	Units
Reverse Stand-Off Voltage	V_{RWM}				5	V
Reverse Breakdown Voltage	V_{BR}	$I_T=1mA$	5.6		9	V
Reverse Leakage Current	I_R	$V_{RWM}=5V, T=25^{\circ}C$			500	nA
Forward Voltage	V_F	$I_F=10mA$	0.5		1.5	V
Channel Input Capacitance to Ground(Pins 1, 2, 4, 5 to Pins 3, 8)	C_{IN}	$V_R=0V, f=1MHz$		0.8	1.0	pF
Clamping Voltage	V_C	$I_{PP}=1A, t_p=8/20\mu s$		10	15	V
ESD Clamping Voltage ¹	V_C	$I_{PP}=4A$ $t_p=0.2/100ns$		9.5		V
ESD Clamping Voltage ¹	V_C	$I_{PP}=16A$ $t_p=0.2/100ns$		15.5		V
Dynamic Resistance ^{1,2}	R_{DYN}	$TLP=0.2/100ns$ I/O to Gnd		0.5		Ω
Channel Resistance(Pins 1-10, 2-9, 4-7 and 5-6)	R_{CH}			6.0		Ω
Differential Mode Cut-off Frequency	f_{3dB}	50 Ω Source and Load Termination		4.0		GHz
Common Mode Stop Band Attenuation	F_{atten}	@ 1GHz		23		dB

Note:

1. TLP Setting : $t_p=100ns, t_r=0.2ns, I_{TLP}$ and V_{TLP} sample window: $t_1=70ns$ to $t_2=90ns$.
2. Dynamic resistance calculated from $I_{PP}=4A$ to $I_{PP}=16A$ using "Best Fit"

Typical Characteristics

Figure 1: Differential attenuation versus frequency (Z0 diff = 100 Ω)

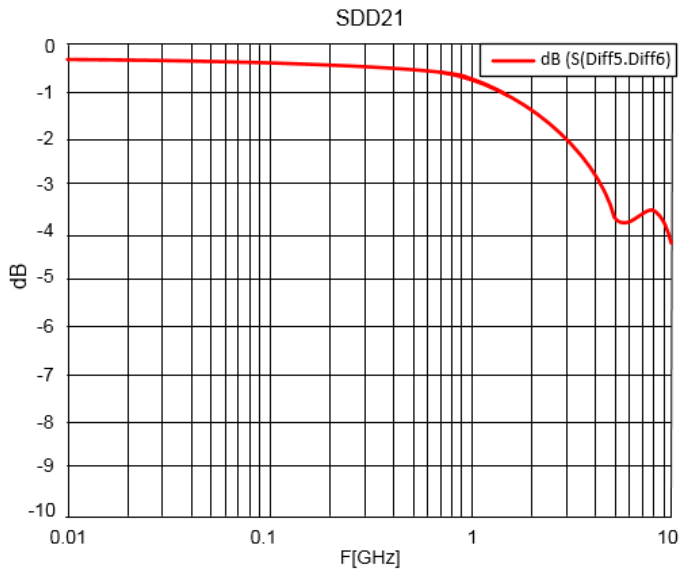


Figure 2: Common mode attenuation versus frequency (Z0 com = 50 Ω)

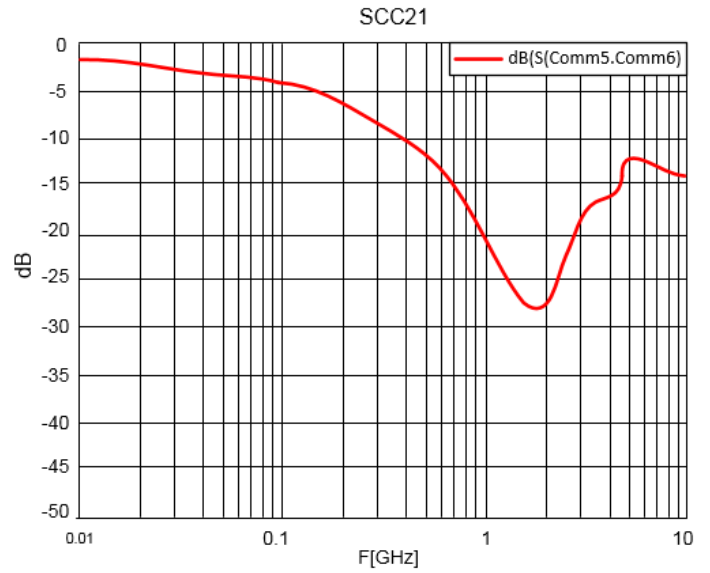


Figure 3: USB 3.0 Eye Diagram Test for 5Gbps Data Rate

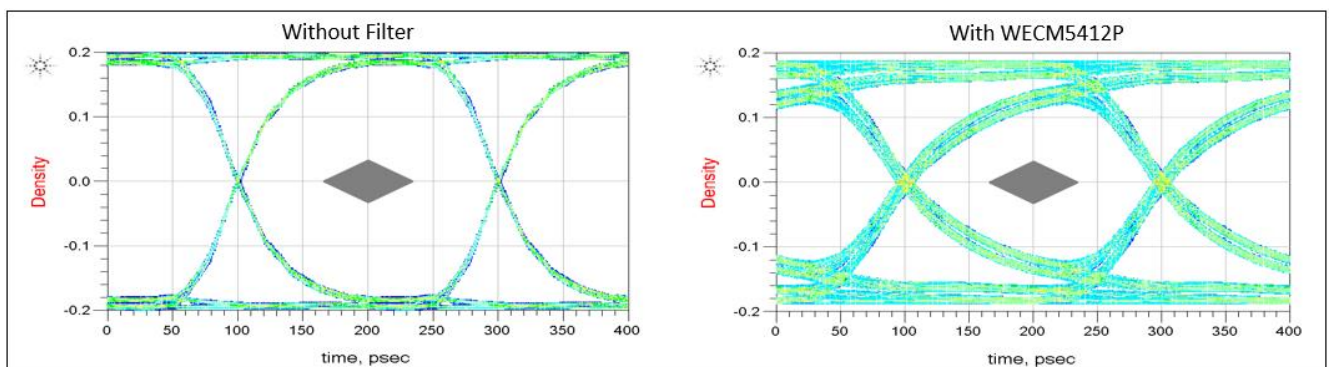


Figure 4: HDMI 2.0 Eye Diagram Test for 6Gbps Data Rate

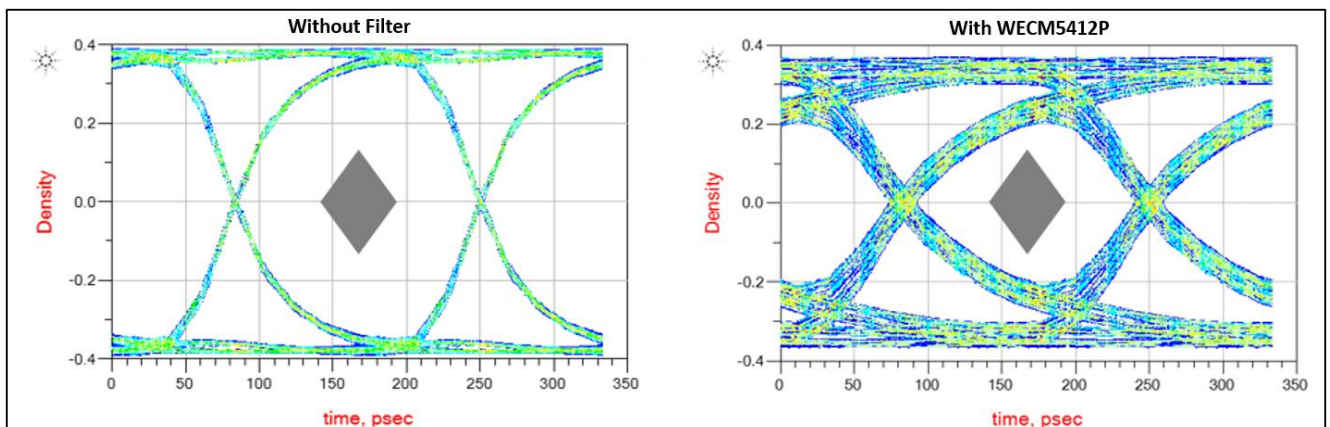


Figure 5: Peak Pulse Power vs. Pulse Time

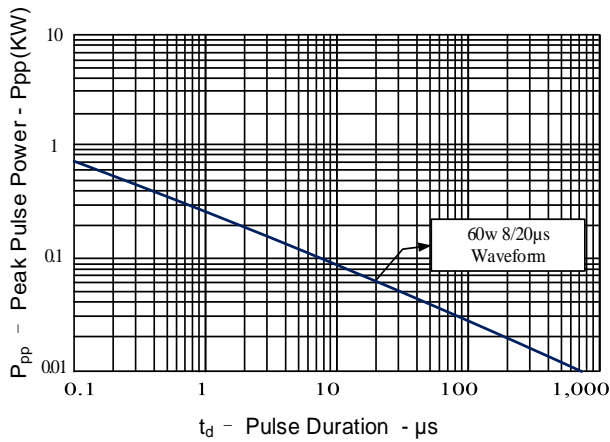


Figure 6: Power Derating Curve

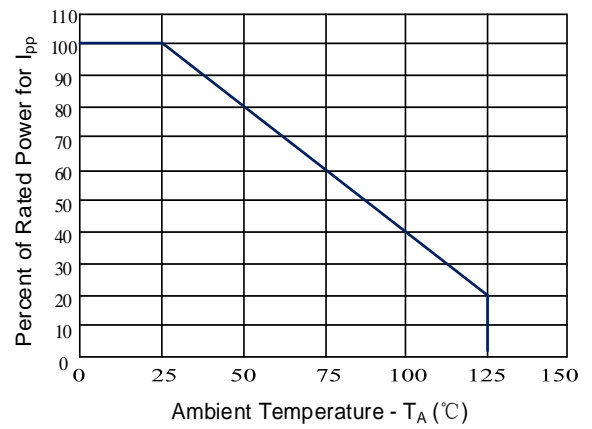


Figure 7: Pulse Waveform

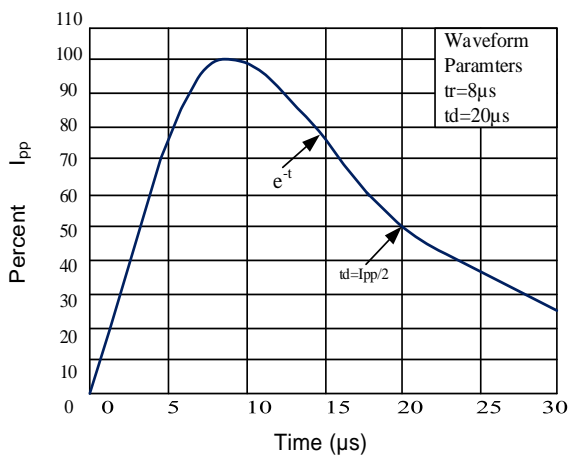


Figure 8: Clamping Voltage vs. Peak Pulse Current

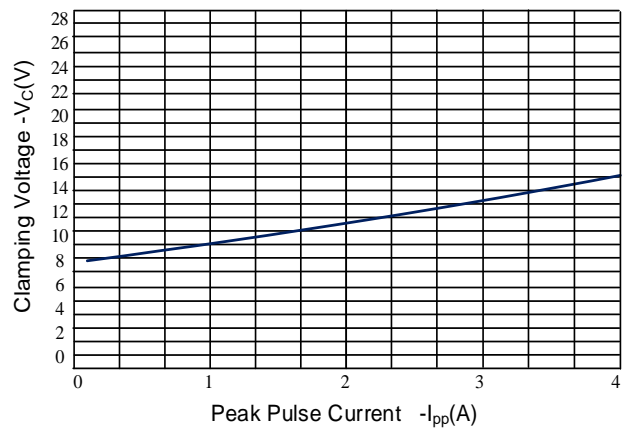


Figure 9: Capacitance vs. Reverse Voltage

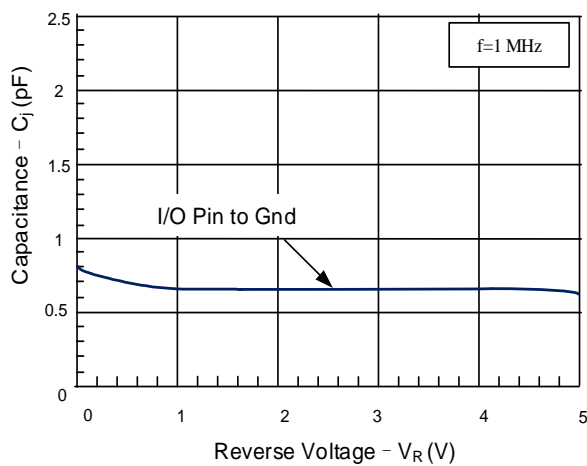
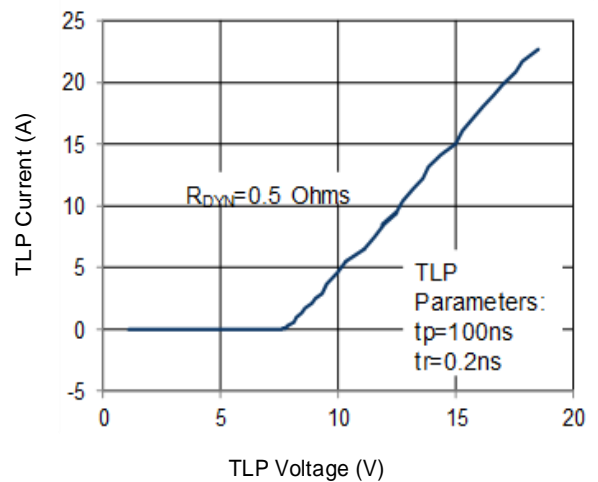
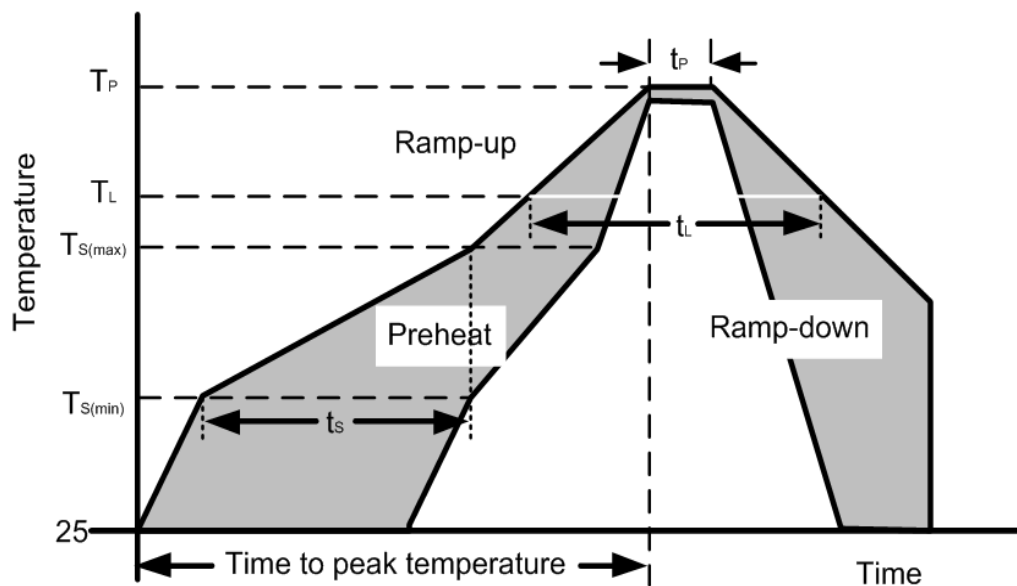


Figure 10: TLP I-V Curve

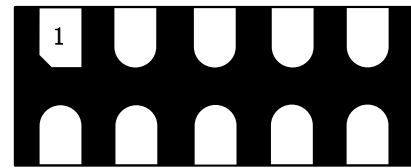
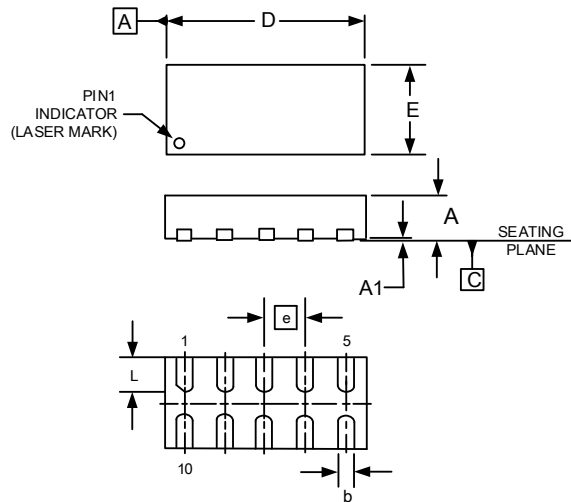


Soldering Parameters

Reflow Condition		Pb – Free assembly
Pre Heat	Temperature Min ($T_{S(min)}$)	150°C
	Temperature Max ($T_{S(max)}$)	200°C
	Time (min to max) (t_s)	60 – 190 secs
Average ramp up rate (Liquidus Temp) (T_L) to peak		5°C/second max
$T_{S(max)}$ to T_L —Ramp-up Rate		5°C/second max
Reflow	Temperature (T_L) (Liquidus)	217°C
	Temperature (t_L)	60 – 150 seconds
Peak Temperature (T_P)		260+0/-5 °C
Time within actual peak Temperature (t_p)		20 – 40 seconds
Ramp-down Rate		5°C/second max
Time 25°C to peak Temperature (T_P)		8 minutes Max.
Do not exceed		280°C



Outline Drawing –DFN-10L



DFN2.6X1.35-10L

SYMBOL	MILLIMETERS		
	MIN	NOM	MAX
A	0.45	0.50	0.55
A1	0.00	0.02	0.05
b	0.15	0.20	0.25
D	2.55	2.60	2.65
E	1.30	1.35	1.40
e	0.50 BSC		
L	0.40	0.50	0.60

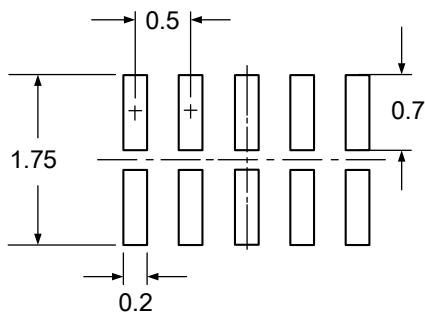
NOTES:

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).

NOTES:

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2. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY. CONSULT YOUR MANUFACTURING TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.



Footprint (dimensions in mm)

Marking Codes

Part Number	DWCM5412P	
Marking Code		<p>CM1=Specific Device Code</p> <p>XXX= Lot Code</p>

Package Information

Qty: 3k/Reel

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