

SMD/BLOCK Type EMI Suppression Filters

EMIFIL[®]



*Innovator
in Electronics*

**Murata
Manufacturing Co., Ltd.**

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Mar.28,2011



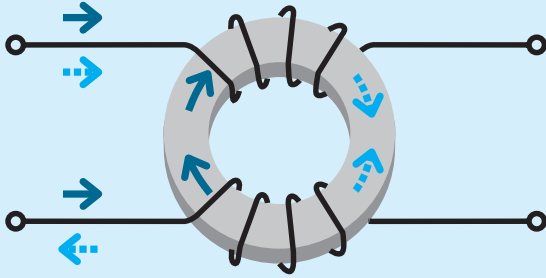
Chip Common Mode Choke Coil
Large Current Common Mode Choke Coil for Automotive Available

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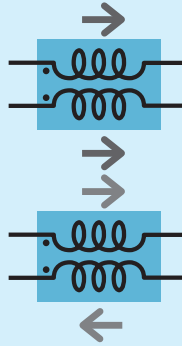
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DL Series Introduction

Common Mode Current



Differential Mode Current



Magnetic flux by common mode current is added each other and works as an inductor

Magnetic flux by differential mode current is canceled each other and do not works as an inductor

Category	Features, Classification	Structure	Part Number	Comments
High cut-off frequency High Coupling (For high speed differential signal lines)	Ultra high cut-off frequency for high speed differential signal lines	Film type	DLP11SA	<ul style="list-style-type: none"> Low profile, small size, suitable for mobile equipments. Tight terminal pitch enables high density layout. Ultra high cut-off frequency and its matching to line impedance enables good transmission of high speed signal.
		Wound type	DLW21SN_HQ2	<ul style="list-style-type: none"> Ultra high self resonance frequency enables high cut-off frequency. Its matching to line impedance enables good transmission of high speed signal.
	High cut-off frequency for high speed differential signal lines	Film type	DLP0NS DLP11SN DLP2AD	<ul style="list-style-type: none"> Low profile, small size, suitable for mobile equipments. Tight terminal pitch enables high density layout. High cut-off frequency enables good transmission of high speed signal.
		Wound type	DLW21SN_SQ2 DLW31S DLW21H	<ul style="list-style-type: none"> Ultra high self resonance frequency enables high cut-off frequency. DLW21H is designed as low profile.
	for general differential signal lines	Film type	DLP31S DLP31D	<ul style="list-style-type: none"> Low profile, small size, suitable for mobile equipments. Tight terminal pitch enables high density layout.
Large current High coupling (For power lines)		Wound type	DLW5AH DLW5BS DLW5BT	<ul style="list-style-type: none"> Large current (6A max.), suitable for input connector from an AC adaptor. DLW5BT is designed as low profile.
Relative high differential mode impedance Low coupling (For audio lines)		Multilayer type	DLM11G DLM2HG	<ul style="list-style-type: none"> Modified its differential mode impedance higher than other common mode choke coils, this feature makes possible to suppress both common mode and differential mode noise. DLM11GN601SD2 is ideal to keep low distortion audio signal. DLM2HG can meet stereo 3 lines which contain a ground line.
Large current Automotive Available (For power lines)	Available up to 10A	Winding type Cased structure	PLT10HH	<ul style="list-style-type: none"> Large current, high reliability, suitable for mortors in automobile.

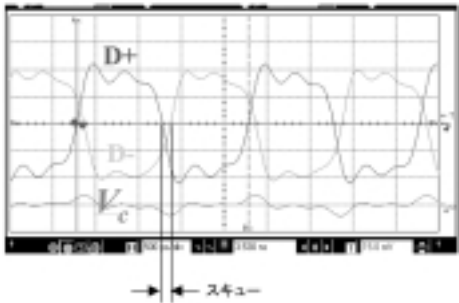
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Skew Improve Effect of Common Mode Choke Coil

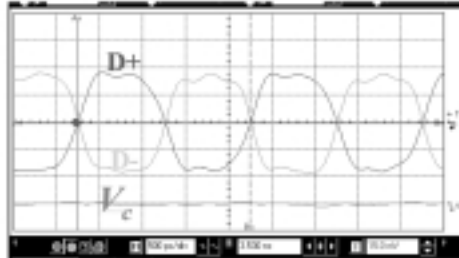
Example of Skew Improvement by Common Mode Choke Coil (Test using pulse generator waveform)

Waveform is equivalent to 1000Mbps signal

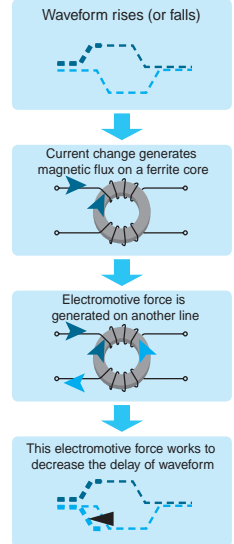
Waveform with intentionally made skew (skew: 100ps)



Skew is improved by common mode choke coil



Mechanism of Skew Improvement

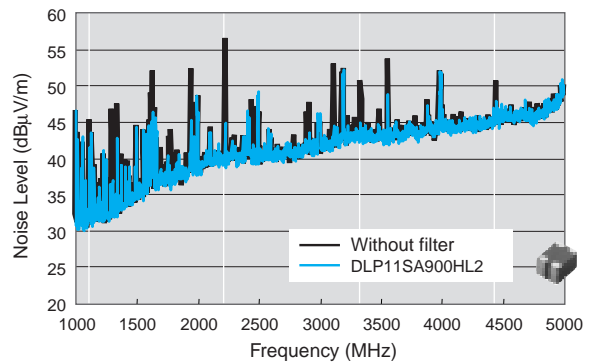
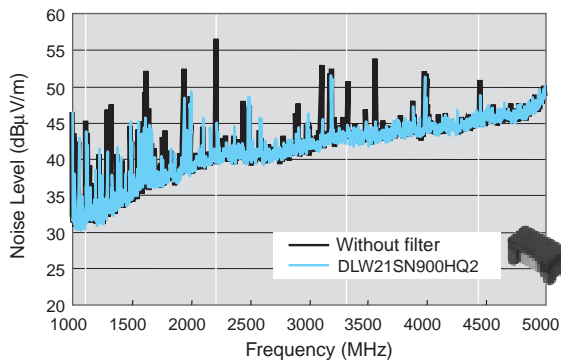


Noise Suppression of Common Mode Choke Coil in HDMI Line

Device under test / Transmitter : game machine Receiver : projector

Cable / HDMI category2 3m cable

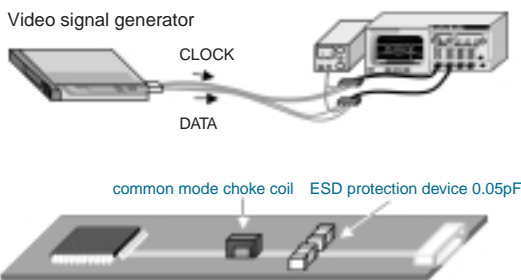
Test resolution / 1080p Deep color 12bit (Data 1.11GHz) DVD play mode



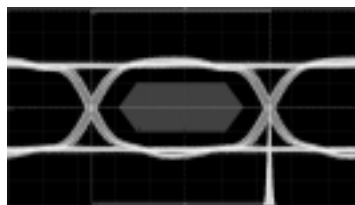
Test Example of HDMI1.3 Waveform Transmission

~Using ESD protection device 0.05pF~

Signal frequency : 1.11GHz (Deep color 12bit)



ESD protection device only



Film Type DLP11SN900HL2 (Cut-off frequency is most low in the table below)

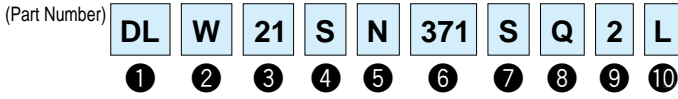


	Wound Type DLW21SN900HQ2	Film Type DLP11SA900HL2	Film Type Array DLP2ADN900HL4
Cut-off Frequency	Over 10GHz	Around 6GHz	Around 4GHz
Judge	Specification satisfied	Specification satisfied	Specification satisfied
Transition Time	Rise time: 83.4ps Fall time: 77.4ps	Rise time: 90.4ps Fall time: 85.5ps	Rise time: 100ps Fall time: 97.4ps

Each of common mode choke coil can keep waveform, satisfy the specification.

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DL □ Chip Common Mode Choke Coil Part Numbering



① Product ID

Product ID	
DL	Chip Common Mode Choke Coils

② Structure

Code	Structure
W	Wire Wound Type
M	Multilayer Type
P	Film Type

③ Dimensions (L×W)

Code	Dimensions (L×W)	EIA
0N	0.85×0.65mm	03025
11	1.25×1.0mm	0504
1N	1.5×0.65mm	05025
21	2.0×1.2mm	0805
31	3.2×1.6mm	1206
2A	2.0×1.0mm	0804
2H	2.5×2.0mm	1008
5A	5.0×3.6mm	2014
5B	5.0×5.0mm	2020

④ Features (1)

Code	Type
S	Magnetically Shielded One Circuit Type
D	Magnetically Shielded Two Circuit Type
H	Open Magnetic One Circuit Type
G	Magnetically Monolithic Type (sectional winding)
T	Magnetically Shielded One Circuit Low Profile Type

⑩ Packaging

Code	Packaging	Series
K	Embossed Taping (ø330mm Reel)	DLW5AH/DLW5BS/DLW5BT
L	Embossed Taping (ø180mm Reel)	All Series
B	Bulk	All Series

⑤ Category

Code	Category
A	Expressed by a letter.
B	
C	
N	
R	

⑥ Impedance

Typical impedance at 100MHz is expressed by three figures. The unit is in ohm (Ω). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two figures.

⑦ Circuit

Code	Circuit
S	Expressed by a letter.
M	
H	
U	

⑧ Features (2)

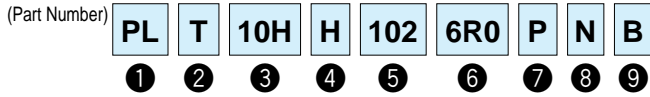
Code	Features
D	Expressed by a letter.
L	
Q	
Z	

⑨ Number of Signal Lines

Code	Number of Signal Lines
2	Two Lines
3	Three Lines
4	Four Lines

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PL □ Common Mode Choke Coils Part Numbering



① Product ID

Product ID	
PL	Common Mode Choke Coils

② Type

Code	Type
T	DC Type

③ Applications

Code	Applications
10H	for DC Line High-frequency Type

④ Features

Code	Features
H	for Automotive

⑨ Packaging

Code	Packaging	Series
B	Bulk	PLT10H
L	Embossed Taping (ø178mm/ø180mm Reel)	PLT10H
K	Embossed Taping (ø330mm Reel)	PLT10H

⑤ Impedance

Expressed by three figures. The unit is ohm (Ω). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two figures.

⑥ Rated Current

Expressed by three figures. The unit is ampere (A). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two figures. A decimal point is expressed by the capital letter "R". In this case, all figures are significant digits.

⑦ Winding Mode

Code	Winding Mode
P	Aligned Winding Type

⑧ Lead Dimensions

Code	Lead Dimensions
N	No Lead Terminal (SMD)

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Type	Size Code (Inch)	Thickness (mm)	Part Number	Common Mode Impedance (at 100MHz/20°C)	Rated Current	New	K _{fit}	≥1A	H _D	≥3A	U _D	Z _{match}	Flow	R _{eFlow}		
Multilayer Type for Audio Lines	0504 <i>p158</i>	0.5	DLM11GN601SD2	600ohm±25%	100mA									R _{eFlow}		
	1008 <i>p159</i>	1.2	DLM2HGN601SZ3	600ohm±25%	100mA								Flow	R _{eFlow}		
Film Type for Differential Signal Lines	<i>p160</i>	0.45	DLP0NSN670HL2	67ohm±20%	110mA		K _{fit}		H _D		Z _{match}			R _{eFlow}		
		0.45	DLP0NSN900HL2	90ohm±20%	100mA		K _{fit}		H _D		Z _{match}			R _{eFlow}		
		0.45	DLP0NSN121HL2	120ohm±20%	90mA		K _{fit}		H _D		Z _{match}			R _{eFlow}		
		0.45	DLP0NSA150HL2	15ohm±5ohm	100mA	New	K _{fit}		U _D		Z _{match}			R _{eFlow}		
		0.45	DLP0NSC280HL2	28ohm±20%	100mA		K _{fit}		U _D		Z _{match}			R _{eFlow}		
	<i>p162</i>	0.82	DLP11SN670SL2	67ohm±20%	180mA		K _{fit}		H _D						R _{eFlow}	
		0.82	DLP11SN121SL2	120ohm±20%	140mA		K _{fit}		H _D						R _{eFlow}	
		0.82	DLP11SN161SL2	160ohm±20%	120mA		K _{fit}		H _D						R _{eFlow}	
		0.82	DLP11SN900HL2	90ohm±20%	150mA		K _{fit}		H _D		Z _{match}				R _{eFlow}	
		0.82	DLP11SN201HL2	200ohm±20%	110mA		K _{fit}		H _D		Z _{match}				R _{eFlow}	
		0.82	DLP11SN241HL2	240ohm±20%	100mA		K _{fit}		H _D		Z _{match}				R _{eFlow}	
		0.82	DLP11SN281HL2	280ohm±20%	90mA		K _{fit}		H _D		Z _{match}				R _{eFlow}	
		0.82	DLP11SN331HL2	330ohm±20%	80mA		K _{fit}		H _D		Z _{match}				R _{eFlow}	
		0.82	DLP11SA350HL2	35ohm±20%	170mA		K _{fit}		U _D		Z _{match}				R _{eFlow}	
		0.82	DLP11SA670HL2	67ohm±20%	150mA		K _{fit}		U _D		Z _{match}				R _{eFlow}	
		0.82	DLP11SA900HL2	90ohm±20%	150mA		K _{fit}		U _D		Z _{match}				R _{eFlow}	
		<i>p163</i>	0.3	DLP11TB800UL2	80ohm±25%	100mA	New	K _{fit}		U _D		Z _{match}			R _{eFlow}	
		<i>p164</i>	1.15	DLP31SN121ML2	120ohm±20%	100mA				H _D						R _{eFlow}
			1.15	DLP31SN221ML2	220ohm±20%	100mA				H _D						R _{eFlow}
			1.15	DLP31SN551ML2	550ohm±20%	100mA				H _D						R _{eFlow}
Film Array Type for Differential Signal Lines	<i>p165</i>	0.45	DLP1NDN350HL4	35ohm±20%	100mA	New	K _{fit}		U _D		Z _{match}			R _{eFlow}		
		0.45	DLP1NDN670HL4	67ohm±20%	80mA	New	K _{fit}		U _D		Z _{match}			R _{eFlow}		
		0.45	DLP1NDN900HL4	90ohm±20%	60mA	New	K _{fit}		U _D		Z _{match}			R _{eFlow}		
	<i>p166</i>	0.82	DLP2ADA350HL4	35ohm±20%	150mA		K _{fit}		U _D		Z _{match}				R _{eFlow}	
		0.82	DLP2ADA670HL4	67ohm±20%	130mA		K _{fit}		U _D		Z _{match}				R _{eFlow}	
		0.82	DLP2ADA900HL4	90ohm±20%	120mA		K _{fit}		U _D		Z _{match}				R _{eFlow}	
		0.82	DLP2ADN670HL4	67ohm±20%	140mA		K _{fit}		H _D		Z _{match}				R _{eFlow}	
		0.82	DLP2ADN900HL4	90ohm±20%	130mA		K _{fit}		H _D		Z _{match}				R _{eFlow}	
		0.82	DLP2ADN121HL4	120ohm±20%	120mA		K _{fit}		H _D		Z _{match}				R _{eFlow}	
		0.82	DLP2ADN161HL4	160ohm±20%	100mA		K _{fit}		H _D		Z _{match}				R _{eFlow}	
		0.82	DLP2ADN201HL4	200ohm±20%	90mA		K _{fit}		H _D		Z _{match}				R _{eFlow}	
	<i>p168</i>	0.82	DLP2ADN241HL4	240ohm±20%	80mA		K _{fit}		H _D		Z _{match}				R _{eFlow}	
		0.82	DLP2ADN281HL4	280ohm±20%	80mA		K _{fit}		H _D		Z _{match}				R _{eFlow}	
		1.15	DLP31DN900ML4	90ohm±20%	160mA				H _D						R _{eFlow}	
		1.15	DLP31DN131ML4	130ohm±20%	120mA				H _D						R _{eFlow}	
1.15		DLP31DN201ML4	200ohm±20%	100mA				H _D						R _{eFlow}		
1.15		DLP31DN321ML4	320ohm±20%	80mA				H _D						R _{eFlow}		
1.15		DLP31DN441ML4	440ohm±20%	70mA				H _D						R _{eFlow}		
Wire Wound Type for Differential Signal Lines	<i>p169</i>	1.2	DLW21SN670SQ2	67ohm±25%	400mA		K _{fit}		H _D					R _{eFlow}		
		1.2	DLW21SN900SQ2	90ohm±25%	330mA		K _{fit}		H _D					R _{eFlow}		
		1.2	DLW21SN121SQ2	120ohm±25%	370mA		K _{fit}		H _D					R _{eFlow}		
		1.2	DLW21SN181SQ2	180ohm±25%	330mA		K _{fit}		H _D						R _{eFlow}	
		1.2	DLW21SN261SQ2	260ohm±25%	300mA		K _{fit}		H _D						R _{eFlow}	
		1.2	DLW21SN371SQ2	370ohm±25%	280mA		K _{fit}		H _D						R _{eFlow}	
		1.2	DLW21SN670HQ2	67ohm±25%	320mA		K _{fit}		U _D		Z _{match}				R _{eFlow}	
		1.2	DLW21SN900HQ2	90ohm±25%	280mA		K _{fit}		U _D		Z _{match}				R _{eFlow}	
		1.2	DLW21SN121HQ2	120ohm±25%	280mA		K _{fit}		U _D		Z _{match}				R _{eFlow}	
	<i>p171</i>	1.2	DLW21SR670HQ2	67ohm±25%	400mA		K _{fit}		U _D		Z _{match}				R _{eFlow}	
		0.9	DLW21HN670SQ2	67ohm±25%	330mA		K _{fit}		H _D						R _{eFlow}	
		0.9	DLW21HN900SQ2	90ohm±25%	330mA		K _{fit}		H _D						R _{eFlow}	
		0.9	DLW21HN121SQ2	120ohm±25%	280mA		K _{fit}		H _D						R _{eFlow}	
		0.9	DLW21HN181SQ2	180ohm±25%	250mA		K _{fit}		H _D						R _{eFlow}	
		0.9	DLW21HN261SQ2	260ohm±25%	230mA		K _{fit}		H _D						R _{eFlow}	
	<i>p172</i>	1.9	DLW31SN900SQ2	90ohm±25%	370mA				H _D						R _{eFlow}	
		1.9	DLW31SN161SQ2	160ohm±25%	340mA				H _D						R _{eFlow}	
		1.9	DLW31SN261SQ2	260ohm±25%	310mA				H _D						R _{eFlow}	
1.9		DLW31SN601SQ2	600ohm±25%	260mA				H _D						R _{eFlow}		
1.9		DLW31SN102SQ2	1000ohm±25%	230mA				H _D						R _{eFlow}		
1206	1.9	DLW31SN222SQ2	2200ohm±25%	200mA				H _D						R _{eFlow}		

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DL□ Chip Common Mode Choke Coil Series Line Up

Type	Size Code (Inch)	Thickness (mm)	Part Number	Common Mode Impedance (at 100MHz/20°C)	Rated Current	New	Kit	≥1A	Hd	≥3A	Ud	Z _{match}	F _{low}	R _{eFlow}	
Wire Wound Type for Power Lines and Signal Lines	2014 ^{p156}	4.3	DLW5AHN402SQ2	4000ohm(Typ.)	200mA		Kit							R _{eFlow}	
	2020 ^{p157}	4.5	DLW5BSN191SQ2	190ohm(Typ.)	5000mA		Kit	≥3A							R _{eFlow}
		4.5	DLW5BSN351SQ2	350ohm(Typ.)	2000mA		Kit	≥1A							R _{eFlow}
		4.5	DLW5BSN102SQ2	1000ohm(Typ.)	1500mA		Kit	≥1A							R _{eFlow}
		4.5	DLW5BSN152SQ2	1500ohm(Typ.)	1000mA		Kit	≥1A							R _{eFlow}
		4.5	DLW5BSN302SQ2	3000ohm(Typ.)	500mA		Kit								R _{eFlow}
		2.5	DLW5BTN101SQ2	100ohm(Typ.)	6000mA		Kit	≥3A							R _{eFlow}
		2.5	DLW5BTN251SQ2	250ohm(Typ.)	5000mA		Kit	≥3A							R _{eFlow}
		2.5	DLW5BTN501SQ2	500ohm(Typ.)	4000mA		Kit	≥3A							R _{eFlow}
	2.5	DLW5BTN102SQ2	1000ohm(Typ.)	2000mA		Kit	≥1A							R _{eFlow}	
2.5	DLW5BTN142SQ2	1400ohm(Typ.)	1500mA		Kit	≥1A							R _{eFlow}		

PL□ Large Current Common Mode Choke Coil for Automotive Available Series Line Up

Type	Size	Thickness (mm)	Part Number	Common Mode Impedance (at 10MHz/20°C)	Rated Current	New	Kit	≥3A	Hd	≥10A	Ud	Z _{match}	F _{low}	R _{eFlow}
Large Current Common Mode Choke Coil for Automotive Available	12.9x6.6 (mm)	9.4	PLT10HH401100PN	400ohm	10A	New	Kit	≥10A						R _{eFlow}
		9.4	PLT10HH501100PN	500ohm	10A	New	Kit	≥10A						R _{eFlow}
		9.4	PLT10HH9016R0PN	900ohm	6A	New	Kit	≥3A						R _{eFlow}
		9.4	PLT10HH1026R0PN	1000ohm	6A	New	Kit	≥3A						R _{eFlow}

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