

### XPerts in Power - Module 6

## Earthing

Steve Dodson

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### Module Topics

- What is Earth?
- Earthing for safety
- Earthing for EMC
- Output earthing

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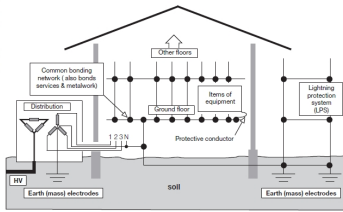
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### What is Earth?







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## What is Earth?

Type of ground	Ground resistivity $\rho$ ( $\Omega m$ )	
	Range of values	Typical value
Boggy ground	2 - 50	30
Adobe clay	2 - 200	40
Silt & sand-clay ground, humus	20 - 280	100
Sand and sandy ground	50 - 3,000	200 (moist)
Peat	200+	200
Gravel (moist)	50 - 3,000	1,000 (moist)
Stony and rocky ground	100 - 8,000	2,000
Concrete: 1 part cement + 3 parts sand	50 - 300	150
Concrete: 1 part cement + 5 parts gravel	100 - 8,000	400

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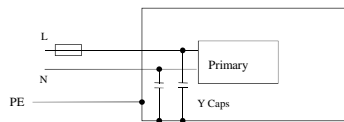
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## Earthing for safety




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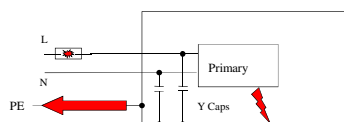
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## Earthing for safety




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### Earthing for EMC

primary - ring main expedites traffic within loop

secondary - traffic control encourages traffic to use bypass

tertiary - bypass keeps traffic away from loop centre

primary - signal layout

tertiary - shielding

secondary - interface filtering

**XP Power**

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### Earthing for EMC - What does it mean for us?

EMC Directive				
Directive	Standard	Test Level	Class	Notes & Comments
Electromagnetic Compatibility	EN61010-1	Class 2	Class 2	EN61010-1
EMC	EN61010-1	Class 2	Class 2	EN61010-1
EMC	EN61010-1	Class 2	Class 2	EN61010-1
EMC	EN61010-1	Class 2	Class 2	EN61010-1
EMC	EN61010-1	Class 2	Class 2	EN61010-1

**XP Power**

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### Earthing for EMC - What to look for

**XP Power**

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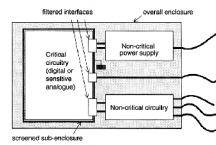
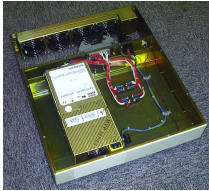
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## Earthing for EMC - What to look for



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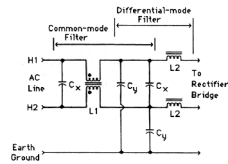
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## Earthing for EMC - What if it still doesn't pass?



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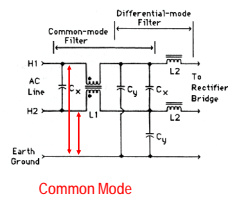
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## Earthing for EMC - What if it still doesn't pass?



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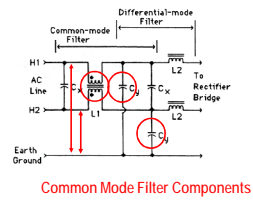
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## Earthing for EMC - What if it still doesn't pass?




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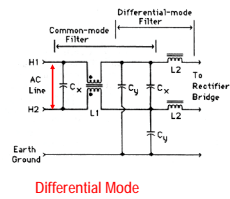
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## Earthing for EMC - What if it still doesn't pass?




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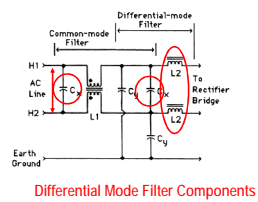
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## Earthing for EMC - What if it still doesn't pass?




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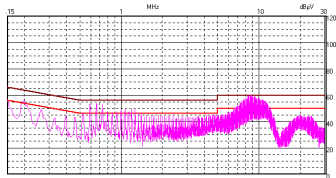
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### Earthing for EMC - What if it still doesn't pass?



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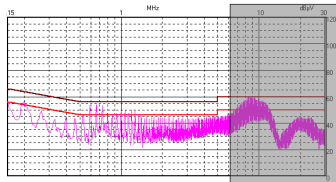
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### Earthing for EMC - What if it still doesn't pass?



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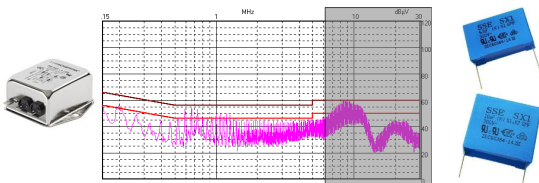
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### Earthing for EMC - What if it still doesn't pass?



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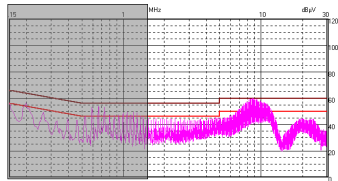
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## Earthing for EMC - What if it still doesn't pass?



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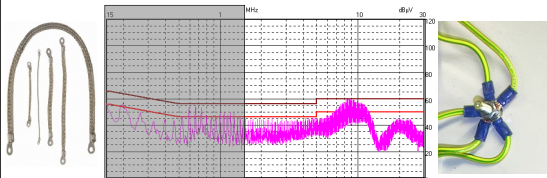
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## Earthing for EMC - What if it still doesn't pass?



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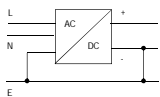
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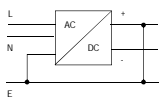
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## Output earthing / system earthing



Negative Earth



Positive Earth

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