premier magnetics
innovators in magnetics technology

RoHS

PM-CSXX CURRENT SENSE TRANSFORMERS

* Designed for Switch Mode Power Supply Applications
* Frequency Range from 10KHz to 200KHz
* Fully Encapsulated Construction
* Tapped and Untapped Versions
* 2500Vrms Minimum Isolation Voltage
* Primary Lead Included

ELECTRICAL SPECIFICATIONS AT 25°C - OPERATING TEMPERATURE RANGE -40°C TO +80°C

CONTROL VALUES				REFERENCE VALUES				CALC. VALUES		
PART NUMBER	TURNS $N_S \pm 1\%$	INDUCTANCE L_S (mH Min.)	DCR R_S (Ohms Max.)	I_{PK} (Amps)	R_T (Ohms)	K_V (Volt/Amp)	DROOP (%)	FLUX FACTOR K_B	LOSS FACTOR K_L	SCHEMATIC
PM-CS01	50	5.0	0.70	35	15	0.30	2.4	273.97×10^{3}	3.31×10^{-9}	A
PM-CS02	100	20.0	1.40	50	50	0.50	2.0	68.49×10^{3}	3.33×10^{-9}	A
PM-CS03	200	80.0	4.50	50	200	1.00	2.0	17.12×10^{3}	3.35×10^{-9}	A
PM-CS04	300	180.0	11.00	75	300	1.00	1.4	7.61×10^{3}	3.37×10^{-9}	A
PM-CS05	50ct	5.0	0.50	35	15	0.30	2.4	273.97×10^{3}	3.31×10^{-9}	B
PM-CS06	100ct	20.0	1.00	50	50	0.50	2.0	68.49×10^{3}	3.33×10^{-9}	B
PM-CS07	200ct	80.0	2.00	50	200	1.00	2.0	17.12×10^{3}	3.35×10^{-9}	B
PM-CS08	300ct	180.0	11.00	75	300	1.00	1.4	7.61×10^{3}	3.37×10^{-9}	B

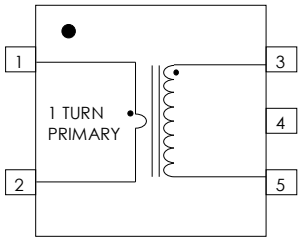
REFER TO CALCULATION EXAMPLE FOR PM-CSXX SERIES ON PAGE 2 OF THIS DATA SHEET.

1) REFERENCE VALUES ARE FOR UNIPOLAR OPERATION @ 50KHz, 40% DUTY CYCLE (Dmax = .40).
2) THE MAXIMUM USABLE PEAK SENSE CURRENT (I_{pk}) IS DEPENDENT ON CORE SATURATION FACTORS AND SHOULD BE EVALUATED FOR THE ACTUAL OPERATING CONDITIONS. SEE APPLICATION DATA AND EXAMPLE ON PAGE 51.
3) THE MAXIMUM RECOMMENDED OPERATING FLUX DENSITY (B_{OP}) @ AN OPERATING TEMPERATURE OF 105°C IS 2000 GAUSS.
4) THE TERM. RESISTOR (R_t) CAN BE VARIED TO ADJUST THE OPERATING FLUX DENSITY (B_{OP}), DROOP, AND SCALE FACTOR (K_V).
5) THE SCALE FACTOR (K_V) IS PROPORTIONAL TO THE TERMINATING RESISTOR (R_T) AND IS EQUAL TO 1VOLT/AMP WHEN $R_T = N_S$
6) SECONDARY INDUCTANCE IS MEASURED AT 20KHz, 1.0VRMS.

SCHEMATIC

SCHEMATIC "A"

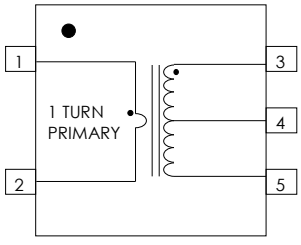
WHITE DOT DENOTES PIN #1



UNUSED PINS MAY BE OMITTED

SCHEMATIC "B"

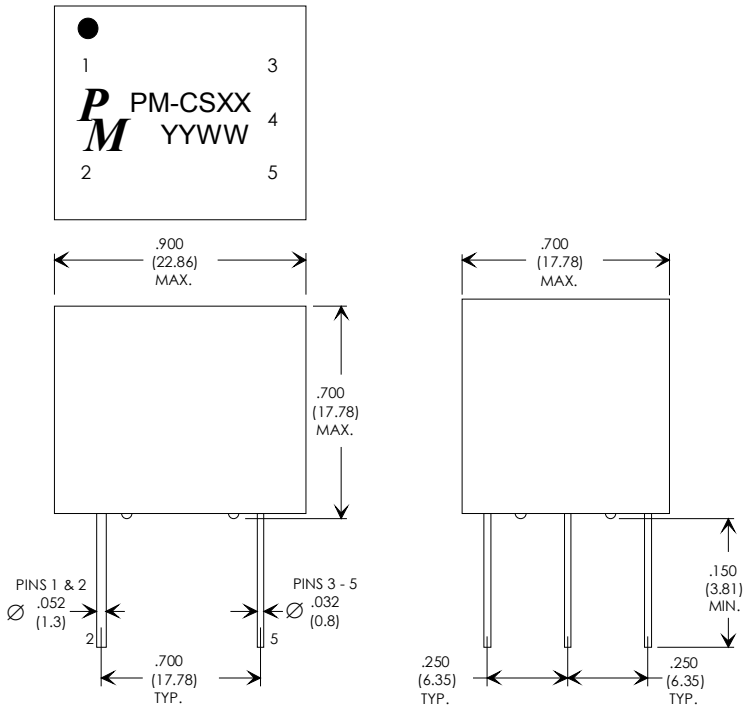
WHITE DOT DENOTES PIN #1



Specifications subject to change without notice.

MECHANICAL

PHYSICAL Dimensions in inches (mm)



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RoHS

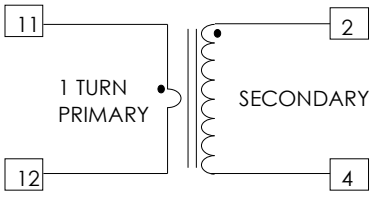
PM-CSXX CURRENT SENSE TRANSFORMERS

* High Current - Primary Rated for 35 Amps RMS
* Frequency Range from 50KHz to 500KHz
* Designed for automatic pick and place
* Maximum height = 10mm

ELECTRICAL SPECIFICATIONS AT 25°C - OPERATING TEMPERATURE RANGE -40°C TO +130°C

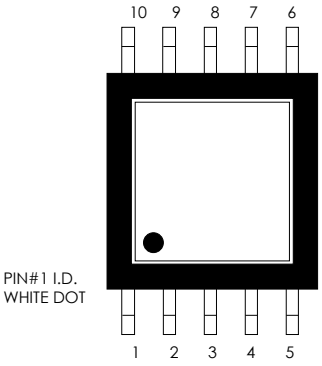
PART NUMBER	TURNS $N_S \pm 1\%$	SEC INDUCTANCE (mH Min.)	SEC DCR (Ohms Max.)	PRI CURRENT (Amps)	HIPOT (Vrms)
PM-CS21	1 : 30	0.50	0.34	35	500
PM-CS22	1 : 50	1.40	0.57	35	500
PM-CS23	1 : 70	2.70	0.80	35	500
PM-CS24	1 : 100	5.60	1.50	35	500
PM-CS25	1 : 200	22.0	5.00	35	500
PM-CS26	1 : 300	50.0	12.0	35	500

SCHEMATIC



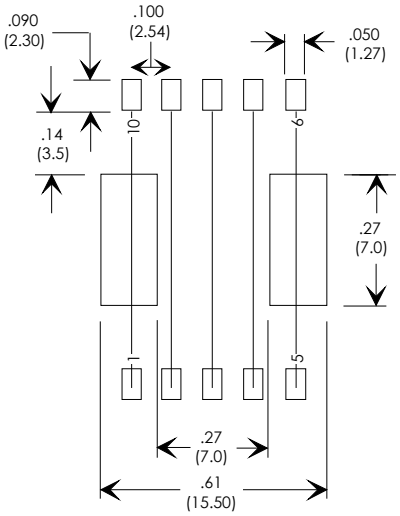
MECHANICAL

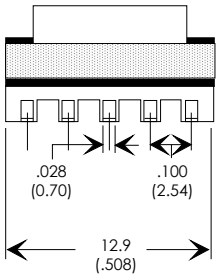
PHYSICAL Dimensions in inches (mm)

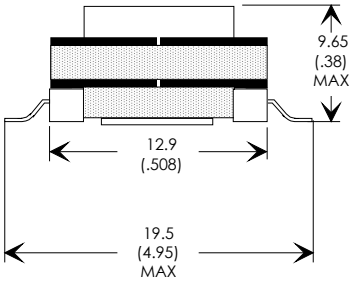


PM-CSXX
YYWW

RECOMMEND LAYOUT







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RoHS

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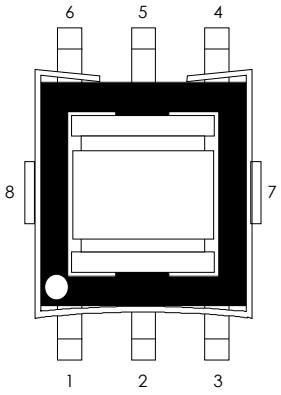
* High Current -Primary Rated
* Frequency Range up to 1MHz
* Designed for automatic pick and place
* Withstands Solder Reflow

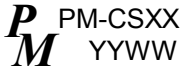
ELECTRICAL SPECIFICATIONS AT 25°C - OPERATING TEMPERATURE RANGE -40°C TO +130°C

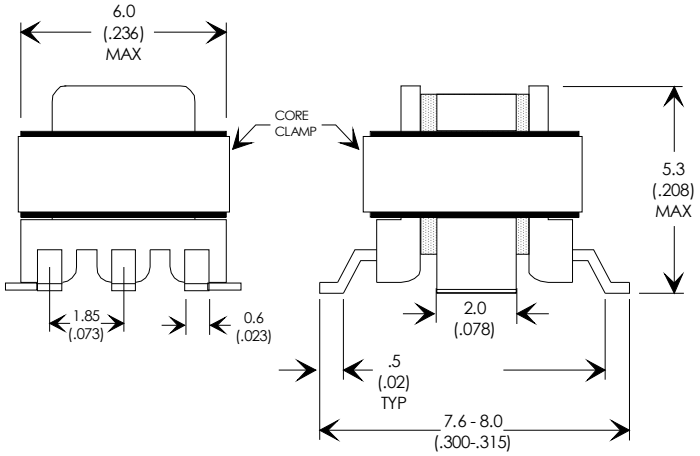
PART NUMBER	TURNS $N_S \pm 1\%$	SEC INDUCTANCE (µH Min.)	SEC DCR (Ohms Max.)	PRI CURRENT (Amps)	HIPOT (Vrms)
PM-CS31	1 : 70	980	4.75	6	500
PM-CS32	1 : 40	320	1.14	6	500
PM-CS33	1 : 30	180	0.87	6	500
PM-CS34	1 : 20	80	0.55	6	500
PM-CS35	1 : 50	500	1.50	6	500
PM-CS36	1 : 60	720	1.75	6	500
PM-CS37	1 : 100	2000	5.50	6	500
PM-CS38	1 : 125	3000	6.50	6	500
PM-CS39	1 : 200	6700	35.0	10	500

MECHANICAL

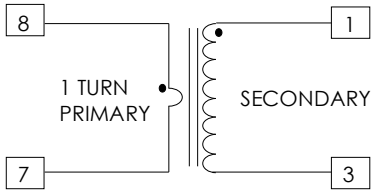
PHYSICAL Dimensions in mm (inches)



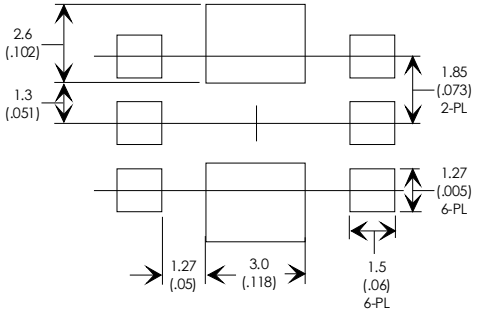




SCHEMATIC



RECOMMEND LAYOUT



Specifications subject to change without notice.

RoHS

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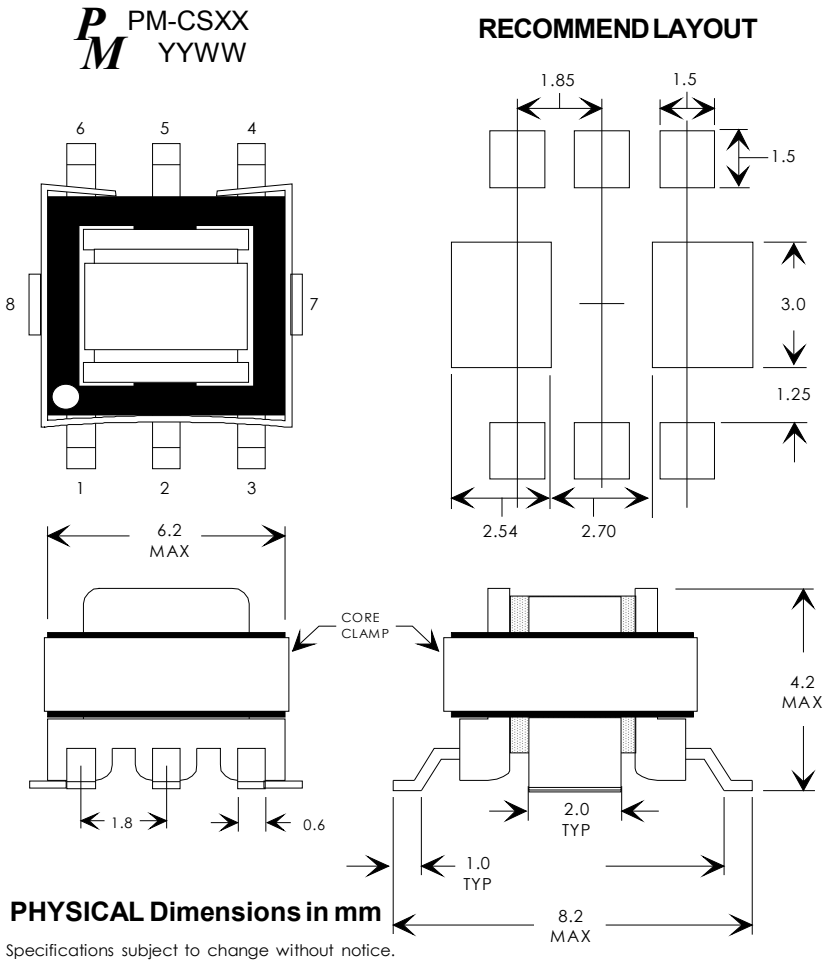
* Withstands Solder Reflow

ELECTRICAL SPECIFICATIONS AT 25°C - OPERATING TEMPERATURE RANGE -40°C TO +130°C

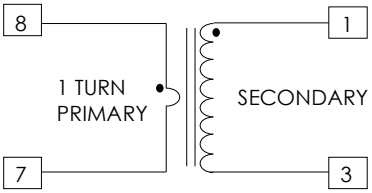
PART NUMBER	TURNS $N_s \pm 1\%$	SEC INDUCTANCE (µH Min.)	SEC DCR (Ohms Max.)	PRI CURRENT (Amps)	HIPOT (Vrms)
PM-CS40	1 : 20	65	0.50	20	500
PM-CS41	1 : 30	145	0.75	20	500
PM-CS42	1 : 40	264	1.05	20	500
PM-CS43	1 : 50	410	1.65	20	500
PM-CS44	1 : 60	590	2.00	20	500
PM-CS45	1 : 70	805	3.00	20	500
PM-CS46	1 : 100	1650	5.40	20	500
PM-CS47	1 : 125	2570	6.70	20	500
PM-CS48	1 : 200	6600	33.30	20	500

MECHANICAL



PHYSICAL Dimensions in mm

SCHEMATIC



Specifications subject to change without notice.

RoHS

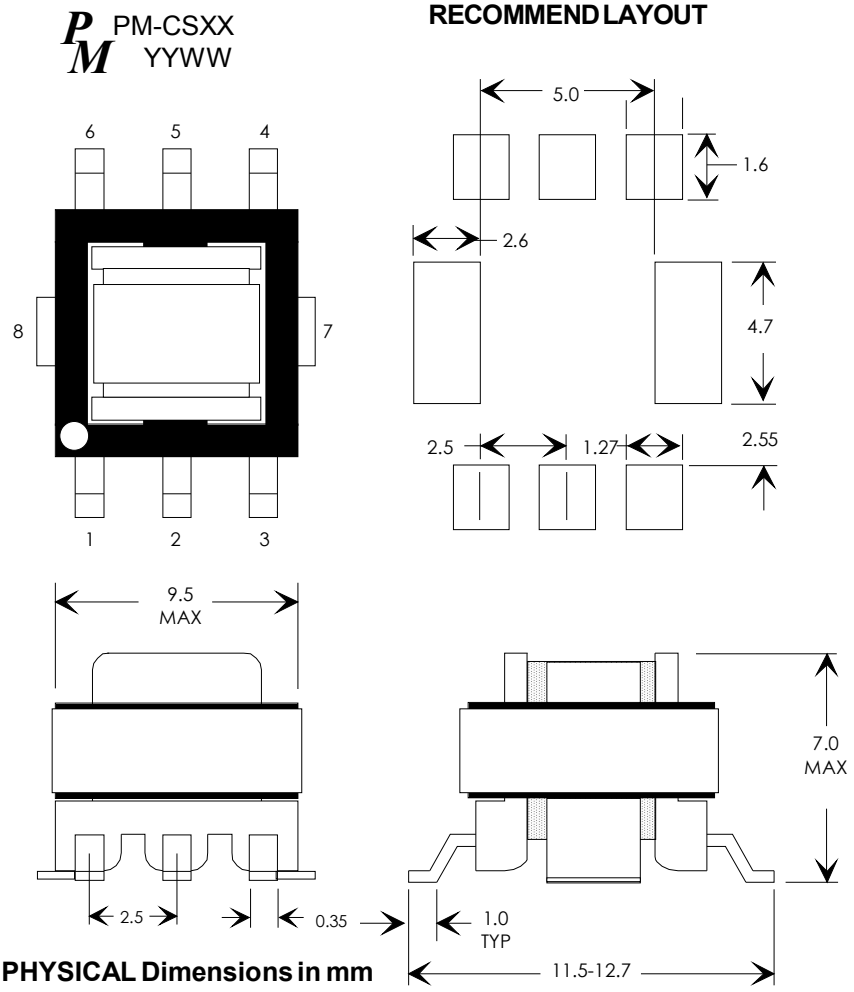
PM-CSXX CURRENT SENSE TRANSFORMERS

* High Current -Primary Rated
* Operating Frequency Range up to 100KHz
* Designed for automatic pick and place
* Withstands Solder Reflow

ELECTRICAL SPECIFICATIONS AT 25°C - OPERATING TEMPERATURE RANGE -40°C TO +130°C

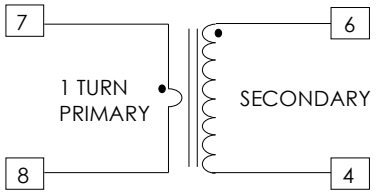
PART NUMBER	TURNS $N_s \pm 1\%$	SEC INDUCTANCE (mH Min.)	SEC DCR (Ohms Max.)	PRI CURRENT (Amps)	HIPOT (Vrms)
PM-CS50	1 : 30	0.20	0.25	20.0	500
PM-CS51	1 : 50	0.55	0.65	20.0	500
PM-CS52	1 : 70	1.10	1.40	20.0	500
PM-CS53	1 : 100	2.10	3.00	20.0	500
PM-CS54	1 : 200	9.00	8.00	20.0	500
PM-CS55	1 : 300	20.0	20.0	20.0	500

MECHANICAL



PHYSICAL Dimensions in mm

SCHEMATIC



Specifications subject to change without notice.

APPLICATION EXAMPLE

APPLICATION EXAMPLE

GIVEN:
Part# = PM-CI02
Peak Current (I_{PK}) = 30.0 Amps
Terminating Resistor (R_T) = 100 Ohms
Operating Frequency (f) = 100KHz
Duty Cycle (Dmax) = .40 (40% on time)

CALCULATE OPERATING FLUX DENSISTY

From the Table the FLUX FACTOR is:
$K_B = 68.49 \times 10^3$

Flux Utilization Constant (K_F) is:
1.0 For Unipolar Operation
2.0 For Bipolar Operation

THEN:
$B_{OP} = K_B \times I_{PK} \times R_T \times (Dmax / K_F \times f)$

$= 68.49x10^3 \times 30 \times 100 \times (.4 / 1 \times 100x10^3)$

= 822 gauss (OK less than 2000 gauss)

CALCULATE PULSE DROOP

From the Table the Secondary Inductance is:
L_S = 20mHy Minimum

Note: The actual droop is dependent on the actual L_S in the circuits enviorment.

Droop Exponent (D) $= R_T \times Dmax / (L_S \times f)$

$= 100 \times .4 / (20x10^{-3} \times 100x10^3)$

= 0.020

THEN:
$\%\_Droop = (1-e^{-D}) \times 100$

= 1.98 %
OK less than 10%
(Depending on the application
Droop to 20% may be acceptable)

CALCULATE THE SCALE FACTOR

From the Table the Secondary Turns are:
$N_S = 100$

THEN:
$K_V = R_T / N_S$

= 100 / 100

= 1 volt/amp

ESTIMATE ERROR DUE TO LOSSES

From the Table the Secondary DCR is:
R_S = 1.40 Ohms Maximum

From the Table the approximate Loss Factor is:
$K_L = 3.33 \times 10^{-9}$

Note: The loss factor (K_L) is valid approximation from10KHz to 200KHz

Secondary Copper Losses are:
$P\_loss_S = (I_{PK} / N_S)^2 \times R_S$

$= (30/100)^2 \times 1.40$

= 0.126 Watt

Core losses are:
$P\_loss_C = K_L^2 \times f^{1.621} \times B_{OP}^{2.569}$

$= (3.33x10^{-9})^2 \times (100x10^3)^{1.621} \times 822^{2.569}$

= 0.0435 Watt

Output Power is:

$P\_out_S = (I_{PK} / N_S)^2 \times R_T$

$= (30/100)^2 \times 100$

= 9.00 Watt

THEN:
$\%\_Error = [(P\_loss_S + P\_loss_C) / P\_out] \times 100$

$= [(.126 + .0435) / 9] \times 100$

= 1.88 %