Power Choke Coil for Automotive application

- Series: PCC-M0530M (MC) PCC-M0540M (MC) PCC-M0630M (MC) PCC-M0645M (MC) PCC-M0754M (MC) PCC-M0750M (MC) PCC-M0854M (MC) PCC-M0850M (MC) PCC-M1054M (MC) PCC-M1050M (MC) PCC-M1050ML (MC) PCC-M1060ML (MC)



IDC (A)

High heat resistance and high reliability Using metal composite core (MC)

Industrial Property : patents 21 (Registered 2/Pending 19)

 High-reliability High vibration resistance as result of newly developed integral construction; under severe reliability conditions of automotive and other strenuous applications High bias current Excellent inductance stability using ferrous alloy magnetic material (Fig.1) Temp. stability Excellent inductance stability over broad temp. range (Fig.1) Low audible (buzz) noise: New metal composite core technology High efficiency Low Rbc of winding and low eddy-current loss of the core 	Features		
 developed integral construction; under severe reliability conditions of automotive and other strenuous applications High bias current Excellent inductance stability using ferrous alloy magnetic material (Fig.1) Temp. stability Excellent inductance stability over broad temp. range (Fig.1) Low audible (buzz) noise: New metal composite core technology High efficiency Low Roc of winding and low eddy-current loss of the core 	 High heat resistance 	: Operation up to 150 °C including self-heating	• Fig.1 Inductance v.s. DC current, Terr
 High bias current Excellent inductance stability using ferrous alloy magnetic material (Fig.1) Temp. stability Excellent inductance stability over broad temp. range (Fig.1) Low audible (buzz) noise: New metal composite core technology High efficiency Low Roc of winding and low eddy-current loss of the core 	 High-reliability 	: High vibration resistance as result of newly	ETQP5M470YFM(reference
 High bias current Excellent inductance stability using ferrous alloy magnetic material (Fig.1) Temp. stability Excellent inductance stability over broad temp. range (Fig.1) Low audible (buzz) noise: New metal composite core technology High efficiency Low Roc of winding and low eddy-current loss of the core 		developed integral construction; under severe	60.0
 High bias current Excellent inductance stability using ferrous alloy magnetic material (Fig.1) Temp. stability Excellent inductance stability over broad temp. range (Fig.1) Low audible (buzz) noise New metal composite core technology High efficiency Low Rbc of winding and low eddy-current loss of the core 			50.0
 magnetic material (Fig.1) Temp. stability Excellent inductance stability over broad temp. range (Fig.1) Low audible (buzz) noise : New metal composite core technology High efficiency Low Roc of winding and low eddy-current loss of the core 			T to a
 Low audible (buzz) noise : New metal composite core technology High efficiency : Low Rbc of winding and low eddy-current loss of the core 	 High bias current 	, , , ,	± 40.0
 Low audible (buzz) noise : New metal composite core technology High efficiency : Low Rbc of winding and low eddy-current loss of the core 			g 30.0
Low audible (buzz) noise : New metal composite core technology High efficiency Low Rbc of winding and low eddy-current loss of the core	Temp. stability	: Excellent inductance stability over broad temp. range (Fig.1)	g 20 0 100 °C
High efficiency E Low Hoc of winding and low eddy-current loss of the core	 Low audible (buzz) noise 	: New metal composite core technology	-+- 125 °C
Shielded construction		: Low RDC of winding and low eddy-current loss of the core	10.0 150 °C
	 Shielded construction 		0.0 0.5 1.0 1.5 2.0 2.5 3.0

AEC-Q200 Automotive gualified

RoHS compliant

Recommended Applications

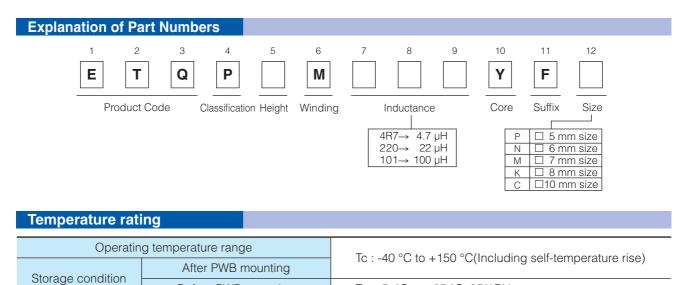
• Noise filter for various drive circuitry requiring high temp. operation and peak current handling capability

Boost-Converter, Buck-Converter DC/DC

Standard Packing Quantity (Minimum Quantity/Packing Unit)

Before PWB mounting

- 1,000 pcs./box (2 reel) : PCC-M0645M, M0754M, M0750M, M0854M, M0850M, M1054M,
 - M1050M, M1050ML, M1060ML
- 2,000 pcs./box (2 reel) : PCC-M0530M, M0540M, M0630M



Ta : -5 °C to +35 °C 85%RH max.

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1. Series PCC-M0530M/PCC-M0540M (ETQP3M VFP/ETQP4M VFP)

Standard Parts								
		Inducta	ance *1	DCR (at 20	°C) (m Ω)	Rateo	d Current (Гур. : А)
Series	Part No.	LO	Tolerance	Тур.	Tolerance	∆T=	40K	△L=-30%
		(µH)	(%)	(max.)	(%)	(*2)	(*3)	(*4)
PCC-M0530M	ETQP3M2R2YFP	2.2		22.6 (24.8)		4.8	5.8	10.9
[5.5×5.0×3.0(mm)]	ETQP3M3R3YFP	3.3	±20	31.3 (34.4)	. 10	4.1	5.0	8.6
PCC-M0540M	ETQP4M4R7YFP	4.7	1 ±20	36.0 (39.6)	±10	4.0	4.8	7.7
[5.5×5.0×4.0(mm)]	ETQP4M220YFP	22]	163 (179)		1.9	2.3	3.1

(*1) Measured at 100 kHz.

(*2) DC current which causes temperature rise of 40 K. Parts are soldered by reflow on four-layer PWB (1.6 mm FR4) and measured at room temperature. See also (*5)

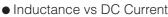
(*3) DC current which causes temperature rise of 40 K. Parts are soldered by reflow on multilayer PWB with high heat dissipation performance. Note: Heat radiation constant are approx. 52 K/W measured on 5.5×5.0×3.0 mm case size and approx. 48 K/W measured on 5.5×5.0×4.0 mm case size. See also (*5)

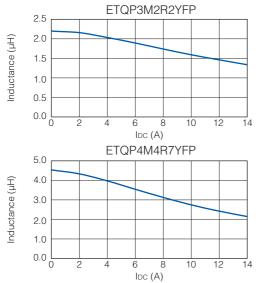
(*4) Saturation rated current : DC current which causes L(0) drop -30 %.

(*5) Within a suitable application, the part's temperature depends on circuit design and certain heat dissipation conditions. This should be double checked in a worst case operation mode. In normal case, the max.standard operating temperature of +150 °C should not be exceeded.

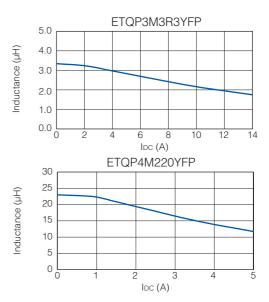
For higher operating temperature conditions, please contact Panasonic representative in your area.

Performance Characteristics (Reference)

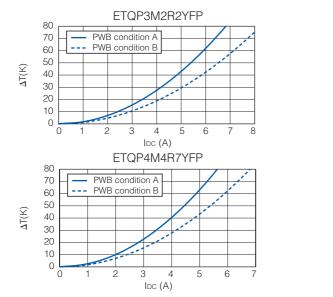


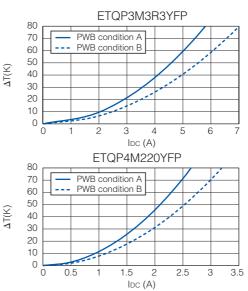






PWB condition A : Four-layer PWB (1.6 mm FR4), See also (*2) PWB condition B : Multilayer PWB with high heat dissipation performance. See also (*3)





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2. Series PCC-M0630M/PCC-M0645M (ETQP3M VFN/ETQP4M VFN)

Standard Parts								
		Inductance *1		DCR (at 20 °C) (mΩ)		Rated Current (1		Тур. : А)
Series	Part No.	LO	Tolerance	Тур.	Tolerance	∆T=40K		△L=-30%
		(µH)	(%)	(max.)	(%)	(*2)	(*3)	(*4)
PCC-M0630M	ETQP3MR68YFN	0.68		6.3 (6.9)		9.8	12.0	24.0
[6.5×6.0×3.0(mm)]	ETQP3M1R0YFN	1.0	-	7.9 (8.7)		8.8	10.7	20.0
	ETQP4M6R8YFN	6.8		39.3 (43.2)		4.1	5.2	10.0
	ETQP4M100YFN	10	±20	54.2 (59.6)	±10	3.3	4.5	8.3
PCC-M0645M [6.5×6.0×4.5(mm)]	ETQP4M220YFN	22		126(138.6)		2.3	2.9	6.0
[/]	ETQP4M330YFN	33		172(189.2)		2.0	2.5	4.1
	ETQP4M470YFN	47		210 (231)		1.8	2.2	3.8

(*1) Measured at 100 kHz.

(*2) DC current which causes temperature rise of 40 K. Parts are soldered by reflow on four-layer PWB (1.6 mm FR4) and measured at room temperature. See also (*5)

(*3) DC current which causes temperature rise of 40 K. Partsare soldered by reflow on multilayer PWB with high heat dissipation performance. Note: Heat radiation constant are approx. 44 K/W measured on 6.5×6.0×3.0 mm case size and approx. 37 K/W measured on 6.5×6.0×4.5 mm case size. See also (*5)

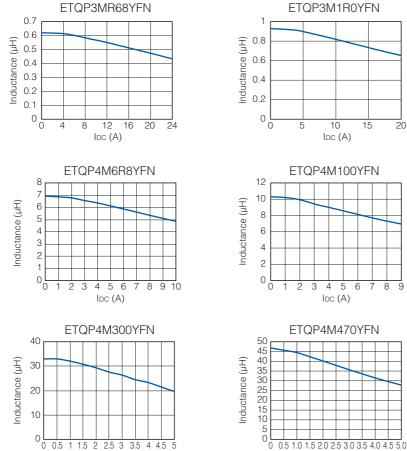
(*4) Saturation rated current : DC current which causes L(0) drop -30 %.

(*5) Within a suitable application, the part's temperature depends on circuit design and certain heat dissipation conditions. This should be double checked in a worst case operation mode. In normal case, the max.standard operating temperature of +150 °C should not be exceeded.

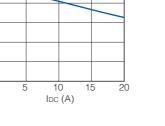
For higher operating temperature conditions, please contact Panasonic representative in your area.

Performance Characteristics (Reference)

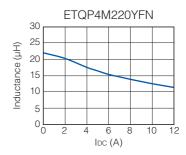
Inductance vs DC Current



IDC (A)



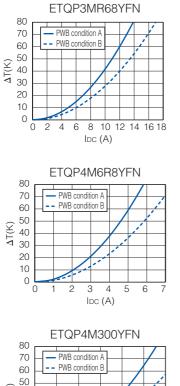
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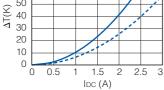


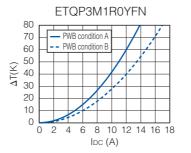
IDC (A)

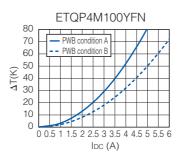
• Case Temperature vs DC Current

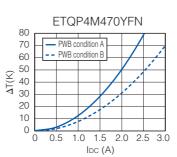
PWB condition A : Four-layer PWB (1.6 mm FR4), See also (*2) PWB condition B : Multilayer PWB with high heat dissipation performance. See also (*3)

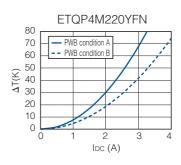












3. Series PCC-M0754M/PCC-M0750M (ETQP5M YFM/ETQP5M YGM)

Standard Parts								
		Inductance *1		DCR (at 20 °C) (mΩ)		Rate	Тур. : А)	
Series	Part No.	LO	Tolerance	Тур.	Tolerance	∆T=	-40K	∆L=–30%
		(µH)	(%)	(max.)	(%)	(*2)	(*3)	(*4)
	ETQP5M4R7YFM	4.7	-	20(23)		6.3	8.0	13.1
	ETQP5M6R8YFM	6.8		26.7(29.4)		5.5	6.9	12.1
PCC-M0754M	ETQP5M100YFM	10		37.6(41.3)		4.7	5.7	10.6
[7.5×7.0×5.4(mm)]	ETQP5M220YFM	22	±20	92(102)	±10	3.0	3.7	5.8
	ETQP5M330YFM	33		120(132)		2.6	3.3	4.8
	ETQP5M470YFM	48		156(172)		2.3	2.9	4.1
PCC-M0750M [7.5×7.0×5.0(mm)]	ETQP5M101YGM	95		348(382.8)		1.4	1.9	3.1

(*1) Measured at 100 kHz.

(*2) DC current which causes temperature rise of 40 K. Parts are soldered by reflow on four-layer PWB (1.6 mm FR4) and measured at room temperature. See also (*5)
 (*3) DC current which causes temperature rise of 40 K. Parts are soldered by reflow on multilayer PWB with high

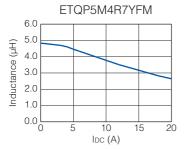
(*3) DC current which causes temperature rise of 40 K. Parts are soldered by reflow on multilayer PWB with high heat dissipation performance. Note: Heat radiation constant is approx. 31 K/W measured on 7.5×7.0×5.4 mm case size and approx. 29 K/W measured on 7.5×7.0×5.0 mm case size. See also (*5)
(*4) Saturation rated current : DC current which causes L(0) drop -30 %.

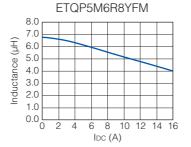
 (*4) Saturation rated current. De current which cases E(0) drop -30 %.
 (*5) Within a suitable application, the part's temperature depends on circuit design and certain heat dissipation conditions. This should be double checked in a worst case operation mode. In normal case, the max.standard operating temperature of +150 °C should not be exceeded.

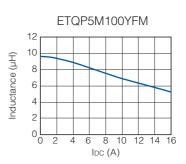
For higher operating temperature conditions, please contact Panasonic representative in your area.

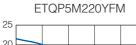
Performance Characteristics (Reference)

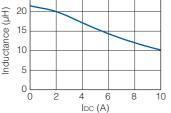
Inductance vs DC Current



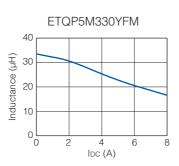


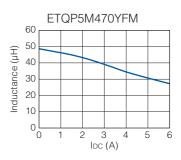






ETQP5M101YGM (H) 80 40 20 0 0 1 2 3 4 5 Ibc (A)





Power Inductors

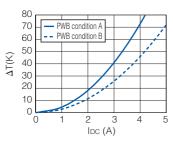
Panasonic

• Case Temperature vs DC Current

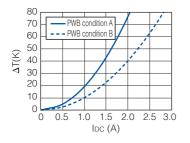
PWB condition A : Four-layer PWB (1.6 mm FR4), See also (*2) PWB condition B : Multilayer PWB with high heat dissipation performance. See also (*3)

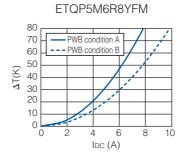
ETQP5M4R7YFM 80 70 PWB condition A PWB condition B 60 50 ΔT(K) 40 30 20 10 0 10 0 4 6 8 2 IDC (A)



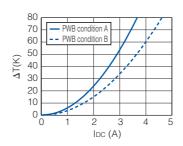


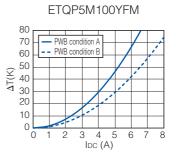
ETQP5M101YGM



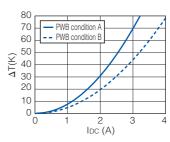


ETQP5M330YFM





ETQP5M470YFM



4. Series PCC-M0854M/PCC-M0850M (ETQP5M VFK/ETQP5M VGK)

Standard Parts								
		Inducta	ance *1	DCR (at 2	0 °C) (mΩ)	Rated Current (Typ. : A)		
Series	Part No.	LO	Tolerance	Тур.	Tolerance	∆T=40K		∆L=–30%
		(µH)	(%)	(max.)	(%)	(*2)	(*3)	(*4)
	ETQP5M2R5YFK	2.5		7.6(8.4)		11.9	14.0	20.1
PCC-M0854M	ETQP5M100YFK	10		33(37)		5.7	6.7	13.0
$[8.5 \times 8.0 \times 5.4(mm)]$	ETQP5M150YFK	15		48.2(53.1)] [4.7	5.5	7.2
[0.3×0.0×3.4(1111)]	ETQP5M220YFK	22	±20	63(70)	±10	4.1	4.8	6.9
	ETQP5M470YFK	48		125(138)		2.9	3.4	5.4
PCC-M0850M [8.5×8.0×5.0(mm)]	ETQP5M101YGK	100		302(333)		1.7	2.1	3.0

(*1) Measured at 100 kHz.

(*2) DC current which causes temperature rise of 40 K. Parts are soldered by reflow on four-layer PWB (1.6 mm FR4) and measured at room temperature. See also (*5)

(*3) DC current which causes temperature rise of 40 K. Parts are soldered by reflow on multilayer PWB with high heat dissipation performance. Note: Heat radiation constant are approx. 27 K/W measured on 8.5×8.0×5.4 mm case size and approx. 29 K/W measured on 8.5×8.0×5.0 mm case size. See also (*5)
 (*4) Saturation rated current : DC current which causes L(0) drop -30 %.

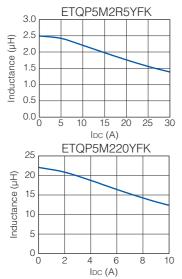
(*5) Within a suitable application, the part's temperature depends on circuit design and certain heat dissipation conditions. This should be double checked in a worst case operation mode.

In normal case, the max.standard operating temperature of + 150 °C should not be exceeded.

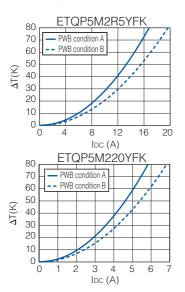
For higher operating temperature conditions, please contact Panasonic representative in your area.

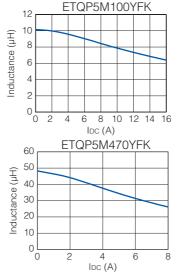
Performance Characteristics (Reference)

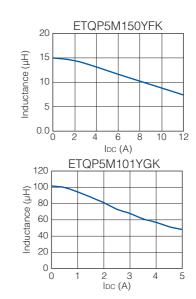
• Inductance vs DC Current



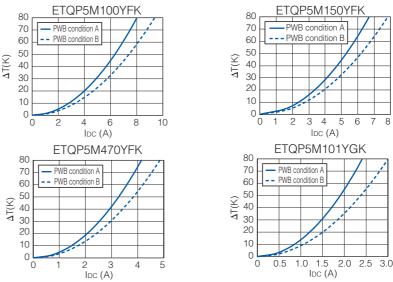
• Case Temperature vs DC Current







PWB condition A : Four-layer PWB (1.6 mm FR4), See also (*2) PWB condition B : Multilayer PWB with high heat dissipation performance. See also (*3)



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5. Series PCC-M1054M/PCC-M1050M (ETQP5M VFC/ETQP5M VGC)

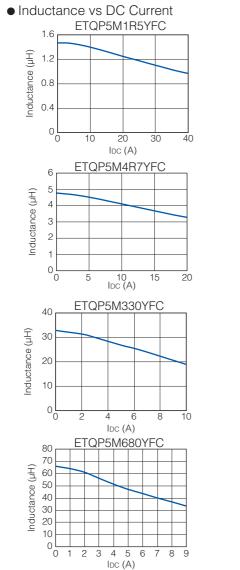
Standard Parts								
		Inducta	ance *1	DCR (at 20	0 °C) (mΩ)	Rated Current (Typ. : A)		
Series	Part No.	LO	Tolerance	Тур.	Tolerance	∆T=	=40K	∆L=–30%
		(µH)	(%)	(max.)	(%)	(*2)	(*3)	(*4)
	ETQP5M1R5YFC	1.45		3.8(4.2)		17.9	21.4	35.1
	ETQP5M2R5YFC	2.5		5.3(5.9)] [15.1	18.1	27.2
	ETQP5M3R3YFC	3.3		7.1(7.9)] [13.1	15.7	22.7
PCC-M1054M	ETQP5M4R7YFC	4.7		10.2(11.3)		10.9	13.1	20.0
$[10.7 \times 10.0 \times 5.4(\text{mm})]$	ETQP5M100YFC	10]	23.8(26.2)] [7.1	8.5	10.7
[10.7 × 10.0 × 5.4(1111)]	ETQP5M220YFC	22	±20	45(50)) ±10 [5.2	6.2	8.8
	ETQP5M330YFC	32.5]	68.5(75.4)] [4.2	5.0	7.6
	ETQP5M470YFC	47	1	99(108.9)	1	3.5	4.2	6.8
	ETQP5M680YFC	66]	136(149.6)] [3.0	3.6	4.9
PCC-M1050M [10.7×10.0×5.0(mm)]	ETQP5M101YGC	97		208(229)		2.2	2.7	3.0

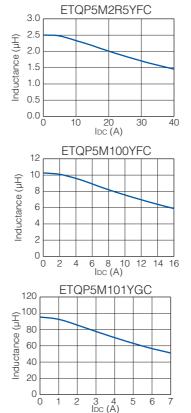
(*1) Measured at 100 kHz.

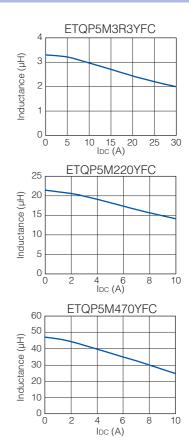
(*2) DC current which causes temperature rise of 40 K. Parts are soldered by reflow on four-layer PWB (1.6 mm FR4)

(*2) DC current which causes temperature rise of 40 K. Parts are soldered by reflow on four-layer PWB (1.6 mm FR4) and measured at room temperature. See also (*5)
(*3) DC current which causes temperature rise of 40 K. Parts are soldered by reflow on multilayer PWB with high heat dissipation performance. Note: Heat radiation constant are approx. 23 KW measured on 10.7×10.0x5.4 mm case size and approx. 26 KW measured on 10.7×10.0x5.0 mm case size. See also (*5)
(*4) Saturation rated current : Dc current which causes L(0) drop -30 %.
(*5) Within a suitable application, the part's temperature depends on circuit design and certain heat dissipation conditions. This should be double checked in a worst case operation mode. In normal case, the max.standard operating temperature of +150 °C should not be exceeded. For higher operating temperature conditions, please contact Panasonic representative in your area.

Performance Characteristics (Reference)







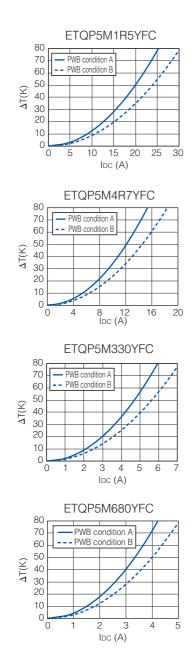
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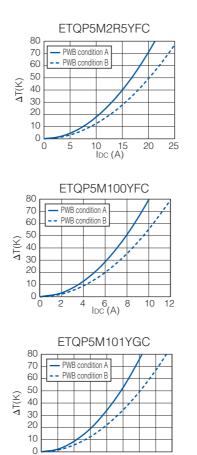
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Panasonic

• Case Temperature vs DC Current

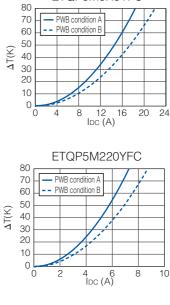
PWB condition A : Four-layer PWB (1.6 mm FR4), See also (*2) PWB condition B : Multilayer PWB with high heat dissipation performance. See also (*3)

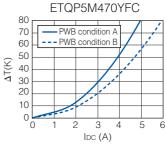




0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 IDC (A)

0





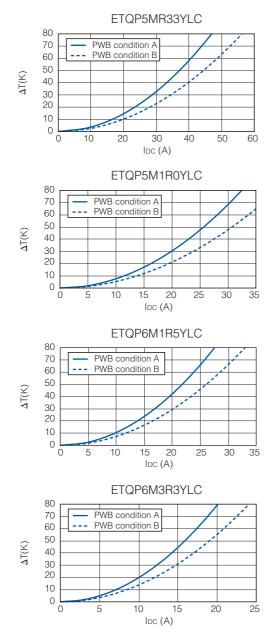
6. Series PCC-M1050ML/PCC-M1060ML (ETQP5M UL/ETQP6M UL/PLC)

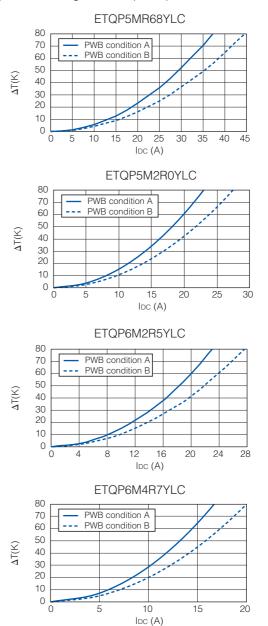
	andard Parts									
			Inducta	ance *1	DCR (a	t 20	°C) (mΩ)	Rate	d Current (
	Series	Part No.	LO	Tolerance	Тур.		olerance		=40K	△L=-30%
		ETODELIDCOV // C	(µH)	(%)	(max.		(%)	(*2)	(*3)	(*4)
_		ETQP5MR33YLC	0.33		1.1(1.2			33.2	39.7	56.7
	CC-M1050ML ×10.0×5.0(mm)]	ETQP5MR68YLC	0.68		1.75(1.9			26.3	31.5	40.0
10.8	10.0×5.0(mm)]	ETQP5M1R0YLC ETQP5M2R0YLC	1.0 2.0		2.3(2.5		-	23.0 16.2	27.5 19.4	37.8 31.3
		ETQP6M1R5YLC	1.5	±20	3.2(3.5		±10	19.5	23.3	32.0
D	CC-M1060ML	ETQP6M2R5YLC	2.5		4.55(5.			16.3	19.6	25.8
	$\times 10.0 \times 6.0(mm)$]	ETQP6M3R3YLC	3.3		6.0(6.6			14.2	17.0	26.3
		ETQP6M4R7YLC	4.7		8.7(9.5		-	11.8	14.1	22.5
*2) [*3) [*4) { *5) \ 0	and measured at r DC current which causes constant are approx. 23 K Saturation rated cu Within a suitable conditions. This shi n normal case, the	causes temperature oom temperature. So temperature rise of 40 K. (W measured on 10.9x10.) rrent : Dc current w application, the p pould be double chere max.standard oper g temperature cond	ee also (*5 Parts are solder 0x5.0 mm case hich causes art's tempe cked in a w rating temp) ed by reflow or size and app s L(0) drop erature dep vorst case c erature of +	n multilayer rox. 23 KM –30 %. pends o peration 150 °C	PWB V mea on c n mc shou	with high he asured on 10. ircuit des ode. uld not be	at dissipation 9×10.0×6.0 m sign and exceeded	performance. nm case size. certain he	Note: Heat radiati See also (*5)
Ре	rformance Ch	aracteristics (R	eference							
	luctance vs DC (
		QP5MR33YLC					ст	QP5MR68		
	0.4					0.7 г				
Ŧ					Ŧ	0.6				
μ) ę	0.3				μ)	0.5				
Inductance (µH)	0.2				0	0.4 0.3				
ucta					lota	0.2				
Indi	0.1				Indi	0.1				
	0.0					n n L				
	0 10 20	30 40 50 60 70	08 C			0.0	10	20 30	40 50	0 60
									·	
	1.2	QP5M1R0YLC			2.5	5 —	El	QP5M2R0	IYLC	
	1.0									
iductance (μH)	0.8				ductance (µH)					
JCe	0.6				e 1.5	5 –				
ctar					1.0 Star					
	0.4					_				
-	0.2									
	0.0 0 10 20) 30 40 50	60		0.0	0	5 10 15	20 25 30	0 35 40 4	L] I5 50
		IDC (A)						IDC (A)		
	ET	QP6M1R5YLC					E	ETQP6M2F	R5YLC	
	2.0					^{3.0}				
Î	1.5				Ĩ	2.5				
Inductance (µH)					Inductance (µH)	2.0				
anc	1.0				anc	1.5				
luct					luct	1.0				
lno	0.5				pul	0.5				
	0.0					0.0 L				
	0 5 10 15	20 25 30 35 40 4 Ibc (A)	45 50			0	10	20 Idc (A)	30	40
	FT	QP6M3R3YLC					FT	QP6M4R7		
	3.5					5			0	
Ŧ	3.0		—		Ŧ	4	\rightarrow	$ \downarrow \downarrow$		
) (µŀ	2.5		—		Inductance (µH)				$ \downarrow $	
nce	2.0	+ $+$ $+$ $+$			Ince	3 -				
đ	1.5				lota	2				+
lot i	1.0				Indu	1				<u> </u>
Induct					_					- I - I
Inductance (µH)	0.5									
Induct	0.0	15 20 25 30 35 Ibc (A)	5 40			0	5 10	15 20 Ibc (A)		35 40

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Should a safety concern arise regarding this product, please be sure to contact us immediately.

• Case Temperature vs DC Current

PWB condition A : Four-layer PWB (1.6 mm FR4), See also (*2) PWB condition B : Multilayer PWB with high heat dissipation performance. See also (*3)

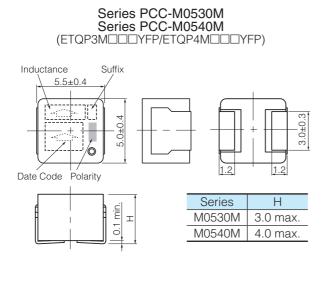




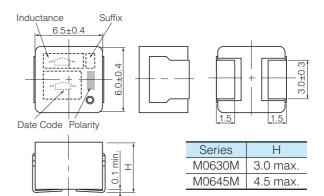
Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Should a safety concern arise regarding this product, please be sure to contact us immediately. 10

Dimensions in mm (not to scale)

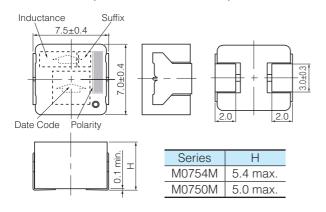
Dimensional tolerance unless noted : ±0.5



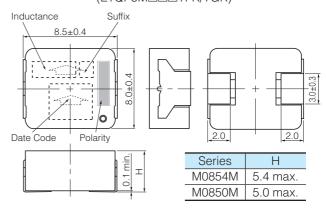
Series PCC-M0630M Series PCC-M0645M (ETQP3MDDDYFN/ETQP4MDDDYFN)



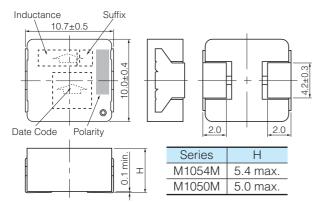
Series PCC-M0754M Series PCC-M0750M (ETQP5MDDDYFM/YGM)



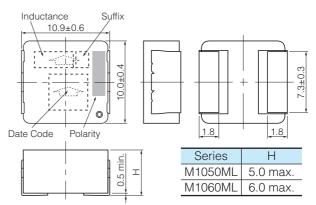
Series PCC-M0854M Series PCC-M0850M (ETQP5MDDDYFK/YGK)



Series PCC-M1054M Series PCC-M1050M (ETQP5MDDDYFC/YGC)



Series PCC-M1050ML Series PCC-M1060ML (ETQP5MDDJLC/ETQP6MDDJLC)



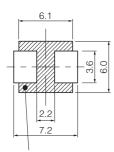
Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Should a safety concern arise regarding this product, please be sure to contact us immediately.

Recommended Land Pattern in mm (not to scale)

Dimensional tolerance unless noted : ±0.5

Series PCC-M0530M

Series PCC-M0540M (ETQP3MUUUYFP/ETQP4MUUUYFP)



Don't wire on the pattern on shaded portion the PWB.

Series PCC-M0630M Series PCC-M0645M (ETQP3MUUUYFN/ETQP4MUUUYFN)

71

28

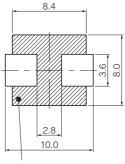
8.8

The same as the left

V

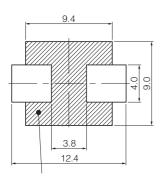
3.6 0

Series PCC-M0754M Series PCC-M0750M (ETQP5MDDDYFM/YGM)



The same as the left.

Series PCC-M0854M Series PCC-M0850M (ETQP5MDDYFK/YGK)



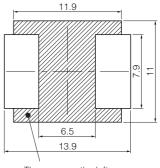
Don't wire on the pattern on shaded portion the PWB

Series PCC-M1054M Series PCC-M1050M (ETQP5MDDYFC/YGC)

11.7 4.0 6.1 13.7 The same as the left

Series PCC-M1050ML Series PCC-M1060ML

 $(ETQP5M \square \square YLC/ETQP6M \square \square YLC)$



The same as the left.

■ As for Packaging Methods, Soldering Conditions and Safety Precautions (Power Choke Coils for Automotive application),

Please see Data Files