

# **Power Choke Coil (Automotive Grade)**

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)



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

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

#### **Features**

- High heat resistance : Operation up to 150 °C including self-heating
- 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

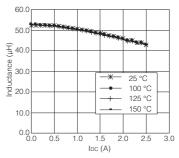
High efficiency : Low Rpc of winding and low eddy-current loss of the core

Shielded construction

AEC-Q200 Automotive qualified

RoHS compliant

# Fig.1 Inductance v.s. DC current, Temp. ETQP5M470YFM(reference)



#### **Recommended Applications**

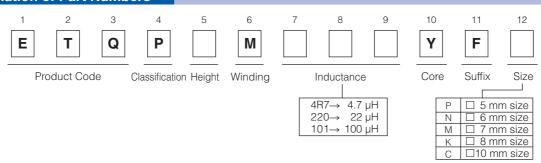
- Noise filter for various drive circuitry requiring high temp. operation and peak current handling capability
- Boost-Converter, Buck-Converter DC/DC

# Standard Packing Quantity (Minimum Quantity/Packing Unit)

 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

### **Explanation of Part Numbers**



#### **Temperature rating**

Operatin	g temperature range	Tc:-40 °C to +150 °C(Including self-temperature rise)		
Storage condition	After PWB mounting	1040 0 to +130 0(moldding sell-temperature rise)		
Storage condition	Before PWB mounting	Ta: -5 °C to +35 °C 85%RH max.		



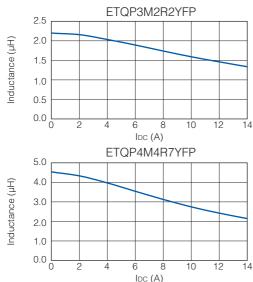
#### 1. Series PCC-M0530M/PCC-M0540M (ETQP3MQQYFP/ETQP4MQQYFP)

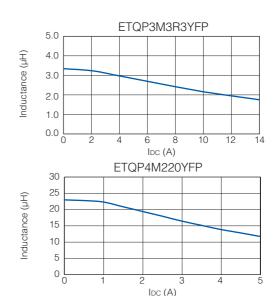
Standard Parts								
		Inductance *1		DCR (at 20 °C) (mΩ)		Rated	Гур. : А)	
Series	Part No.	L0	Tolerance	Тур.	Tolerance	△T=	:40K	△L=-30%
		(µH) (%)	(max.)	(%)	(*2)	(*3)	(*4)	
PCC-M0530M	ETQP3M2R2YFP	2.2		22.6 ( 24.8)		4.8	5.8	10.9
$[5.5 \times 5.0 \times 3.0 (mm)]$	ETQP3M3R3YFP	3.3	±20	31.3 ( 34.4)	±10	4.1	5.0	8.6
PCC-M0540M	ETQP4M4R7YFP	4.7	±20	36.0 ( 39.6)	] ±10 [	4.0	4.8	7.7
[5.5×5.0×4.0(mm)]	ETQP4M220YFP	22		163.0 (179.0)		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.

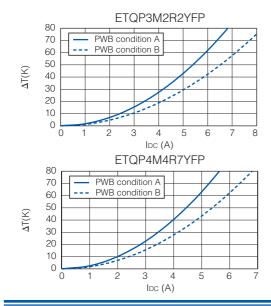
### **Performance Characteristics (Reference)**

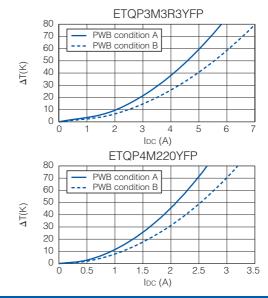
#### Inductance vs DC Current





Case Temperature vs DC Current







#### 2. Series PCC-M0630M/PCC-M0645M (ETQP3M PTV)ETQP4M PVFN)

Standard Parts								
		Induct	ance *1	DCR (at 20°	$^{\circ}C)$ (m $\Omega$ )	Rated Current (Typ. : A)		
Series	Part No.	LO	Tolerance	Тур.	Tolerance	△T=	-40K	△L=-30%
		(µH)	(%)	(max.)	(%)	(*2)	(*3)	(*4)
PCC-M0630M	ETQP3MR68YFN	0.68		6.30 ( 6.90)		9.8	12.0	24.0
[6.5×6.0×3.0(mm)]	ETQP3M1R0YFN	1.0		7.90 ( 8.70)		8.8	10.7	20.0
NEW	ETQP4M3R3YFN	3.3	3.3	16.10 ( 17.71)		6.4	8.2	13.3
	ETQP4M6R8YFN	6.8	±20	39.30 ( 43.20)	±10	4.1	5.2	10.0
PCC-M0645M	ETQP4M100YFN	10	] ±20	54.20 ( 59.60)	±10	3.3	4.5	8.3
$[6.5 \times 6.0 \times 4.5 (mm)]$	ETQP4M220YFN	22		126.00 (138.60)		2.3	2.9	6.0
	ETQP4M330YFN	33		172.00 (189.20)		2.0	2.5	4.1
	ETQP4M470YFN	47		210.00 (231.00)		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 %.

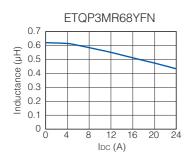
(\*5) Within a suitable application, the part's temperature depends on circuit design and certain heat dissipation conditions. This should be double checked in a worst case operation mode.

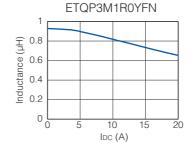
In normal case, the max.standard operating temperature of +150 °C should not be exceeded.

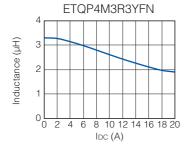
For higher operating temperature conditions, please contact Panasonic representative in your area.

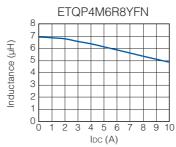
#### **Performance Characteristics (Reference)**

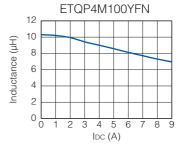
#### Inductance vs DC Current

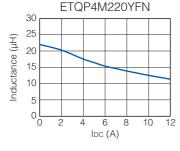


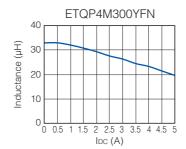


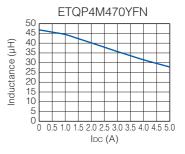






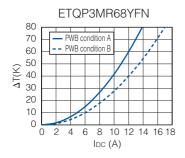


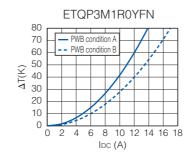


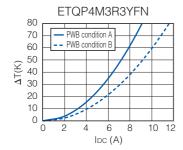


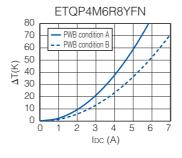
# **Panasonic**

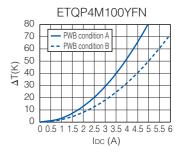
• Case Temperature vs DC Current

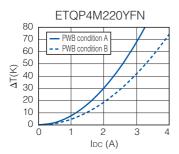


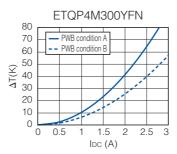


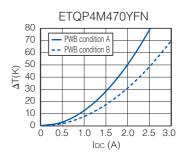














#### 3. Series PCC-M0754M/PCC-M0750M (ETQP5M□□□YFM/ETQP5M□□□YGM)

#### **Standard Parts** DCR (at 20 °C) (mΩ) Rated Current (Typ.: A) Inductance \*1 Series Part No L<sub>0</sub> Tolerance Tolerance △T=40K △L=-30% Typ. $(\mu H)$ (max.) (\*4)(%) (%)(\*2)(\*3)ETQP5M4R7YFM 20.00 ( 23.00) 8.0 4.7 6.3 13.1 ETQP5M6R8YFM 6.8 26.70 ( 29.40) 5.5 6.9 12.1 ETQP5M100YFM 10 37.60 (41.30) 4.7 5.7 10.6 PCC-M0754M $[7.5 \times 7.0 \times 5.4(mm)]$ ETQP5M220YFM 3.0 3.7 22 92.00 (102.00) 5.8 ±20 ±10 ETQP5M330YFM 33 120.00 (132.00) 2.6 3.3 4.8 ETQP5M470YFM 48 156.00 (172.00) 2.3 2.9 4.1 PCC-M0750M ETQP5M101YGM 95 348.00 (382.80) 1.4 1.9 3.1 $[7.5 \times 7.0 \times 5.0 (mm)]$

(\*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)

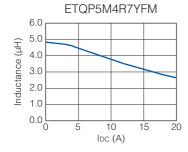
(\*3) DC current which causes temperature rise of 40 K. Parts are soldered by reflow on multilayer PWB with high heat dissipation performance. Note: Heat radiation constant is approx. 31 K/W measured on 7.5×7.0×5.4 mm case size and approx. 29 K/W measured on 7.5×7.0×5.0 mm case size. See also (\*5) (\*4)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

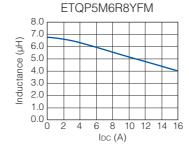
(\*5) Within a suitable application, the part's temperature depends on circuit design and certain heat dissipation conditions. This should be double checked in a worst case operation mode. In normal case, the max.standard operating temperature of +150 °C should not be exceeded.

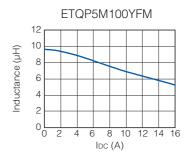
For higher operating temperature conditions, please contact Panasonic representative in your area.

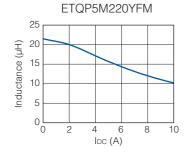
# **Performance Characteristics (Reference)**

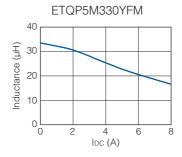
#### Inductance vs DC Current

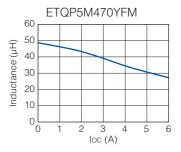


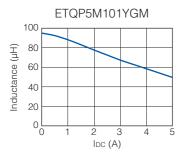








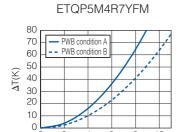




• Case Temperature vs DC Current

PWB condition A: Four-layer PWB (1.6 mm FR4), See also (\*2)

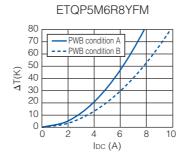
PWB condition B: Multilayer PWB with high heat dissipation performance. See also (\*3)

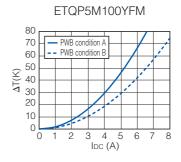


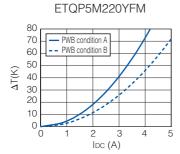
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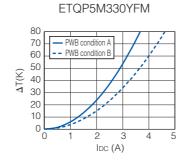
IDC (A)

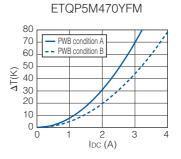
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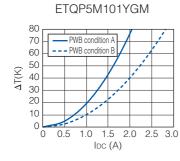














#### 4. Series PCC-M0854M/PCC-M0850M (ETQP5MDDTFK/ETQP5MDDTGK)

Standard Parts								
		Inductance *1		DCR (at 20 °C) (mΩ)		Rated Current (Typ. : A)		
Series	Part No.	L0	Tolerance	Тур.	Tolerance	e ∆T=40K		△L=-30%
		(µH)	(%)	(max.)	(%)	(*2)	(*3)	(*4)
	ETQP5M2R5YFK	2.5		7.60 ( 8.40)	±10	11.9	14.0	20.1
PCC-M0854M	ETQP5M100YFK	10	]	33.00 ( 37.00)		5.7	6.7	13.0
$[8.5 \times 8.0 \times 5.4(mm)]$	ETQP5M150YFK	15	]	48.20 ( 53.10)		4.7	5.5	7.2
[6.5×6.0×5.4(11111)]	ETQP5M220YFK	22	±20	63.00 ( 70.00)		4.1	4.8	6.9
	ETQP5M470YFK	48	]	125.00 (138.00)		2.9	3.4	5.4
PCC-M0850M [8.5×8.0×5.0(mm)]	ETQP5M101YGK	100		302.00 (333.00)		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)

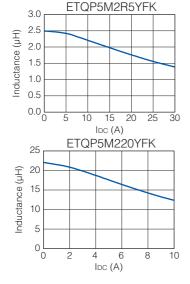
(\*3) DC current which causes temperature rise of 40 K. Parts are soldered by reflow on multilayer PWB with high heat dissipation performance. Note: Heat radiation constant are approx. 27 K/W measured on 8.5×8.0×5.4 mm case size and approx. 29 K/W measured on 8.5×8.0×5.0 mm case size. See also (\*5)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

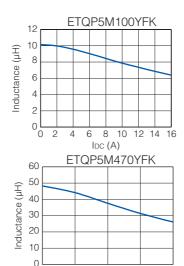
(\*5) Within a suitable application, the part's temperature depends on circuit design and certain heat dissipation conditions. This should be double checked in a worst case operation mode. In normal case, the max standard operating temperature of + 150 °C should not be exceeded.

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

# **Performance Characteristics (Reference)**

Inductance vs DC Current

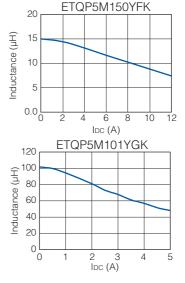




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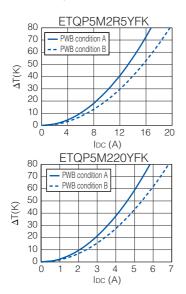
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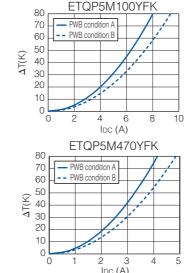
IDC (A)

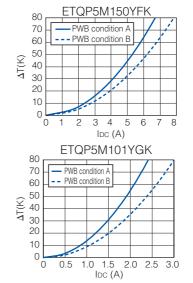


Case Temperature vs DC Current











#### 5. Series PCC-M1054M/PCC-M1050M (ETQP5M CTQP5M CTQP

Standard Parts								
		Inductance *1		DCR (at 20	°C) (m\O)	Rated Current (Typ. : A)		
Series	Part No.	LO	Tolerance	Тур.	Tolerance	△T=40K		△L=-30%
		(µH)	(%)	(max.)	(%)	(*2)	(*3)	(*4)
	ETQP5M1R5YFC	1.45		3.80 ( 4.20)		17.9	21.4	35.1
	ETQP5M2R5YFC	2.5	]	5.30 ( 5.90)	] [	15.1	18.1	27.2
	ETQP5M3R3YFC	3.3		7.10 ( 7.90)		13.1	15.7	22.7
	ETQP5M4R7YFC	4.7		10.20 ( 11.30)	] [	10.9	13.1	20.0
PCC-M1054M	ETQP5M100YFC	10		23.80 ( 26.20)	] [	7.1	8.5	10.7
$[10.7 \times 10.0 \times 5.4(mm)]$	ETQP5M150YFC	15	±20	35.60 ( 39.16)	±10	5.8	7.0	12.0
	ETQP5M220YFC	22	] =20	45.00 ( 50.00)		5.2	6.2	8.8
	ETQP5M330YFC	32.5		68.50 ( 75.40)	] [	4.2	5.0	7.6
	ETQP5M470YFC	47		99.00 (108.90)	] [	3.5	4.2	6.8
	ETQP5M680YFC	66	]	136.00 (149.60)	] [	3.0	3.6	4.9
PCC-M1050M [10.7×10.0×5.0(mm)]	ETQP5M101YGC	97		208.00 (229.00)		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)

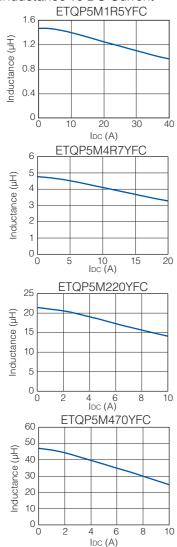
(\*2) DC current which causes temperature rise of 40 K. Parts are soldered by reflow on four-layer PWB (1.6 mm FR4) and measured at room temperature. See also (\*5)
(\*3) DC current which causes temperature rise of 40 K. Parts are soldered by reflow on multilayer PWB with high heat dissipation performance. Note: Heat radiation constant are approx. 23 K/W measured on 10.7×10.0×5.0 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.

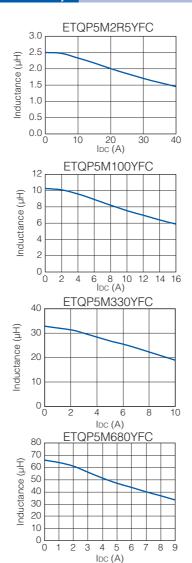
In normal case, the max.standard operating temperature of +150 °C should not be exceeded.

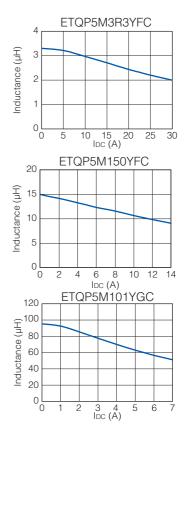
For higher operating temperature conditions, please contact Panasonic representative in your area.

#### **Performance Characteristics (Reference)**

• Inductance vs DC Current

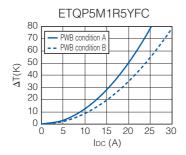


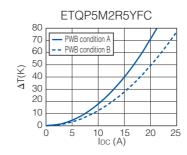


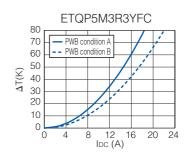


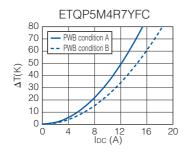
# **Panasonic**

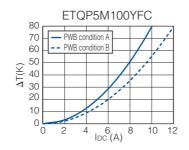
Case Temperature vs DC Current

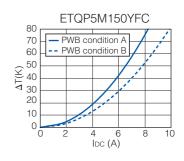


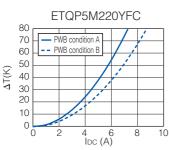


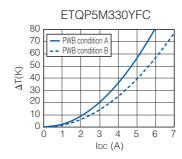


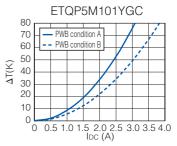


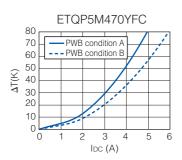


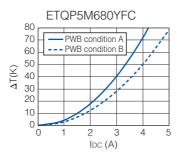














#### 6. Series PCC-M1050ML/PCC-M1060ML (ETQP5M□□□YLC/ETQP6M□□□YLC)

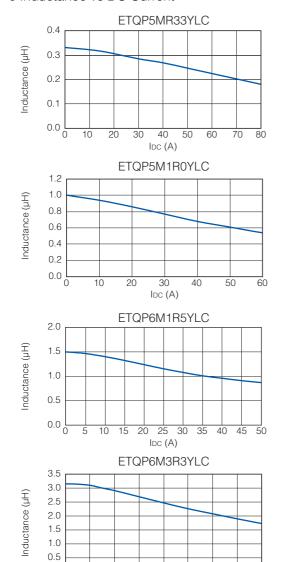
Standard Parts								
		Inductance *1		DCR (at 20 °C) (mΩ)		Rated Current (Typ. : A)		
Series	Part No.	L0	Tolerance	Тур.	Tolerance	△T=40K		△L=-30%
		(µH)	(%)	(max.)	(%)	(*2)	(*3)	(*4)
	ETQP5MR33YLC	0.33		1.10 (1.21)		33.2	39.7	56.7
PCC-M1050ML	ETQP5MR68YLC	0.68		1.75 (1.93)		26.3	31.5	40.0
$[10.9 \times 10.0 \times 5.0 (mm)]$	ETQP5M1R0YLC	1.0		2.30 (2.53)		23.0	27.5	37.8
	ETQP5M2R0YLC	2.0	±20	4.60 (5.06)	±10	16.2	19.4	31.3
	ETQP6M1R5YLC	1.5	±20	3.20 (3.52)	] = 10 [	19.5	23.3	32.0
PCC-M1060ML	ETQP6M2R5YLC	2.5	]	4.55 (5.00)	] [	16.3	19.6	25.8
[10.9×10.0×6.0(mm)]		3.3	]	6.00 (6.60)		14.2	17.0	26.3
(*1) Maggurad at 100 k	ETQP6M4R7YLC	4.7		8.70 (9.57)		11.8	14.1	22.5

(\*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 K/W measured on 10.9×10.0×5.0 mm case size and approx. 23 K/W measured on 10.9×10.0×6.0 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.

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)**

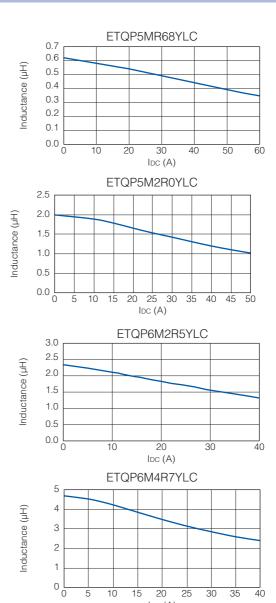
#### Inductance vs DC Current



0.0

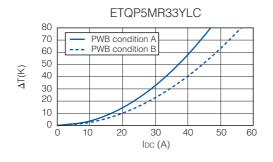
10 15 20 25 30 35 40

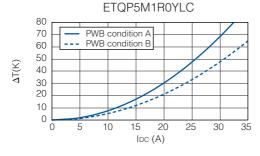
IDC (A)

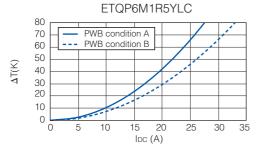


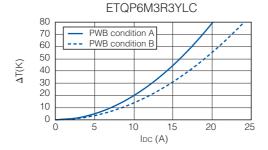
# **Panasonic**

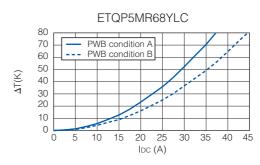
Case Temperature vs DC Current

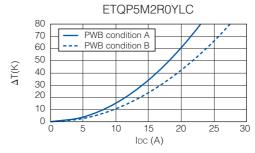


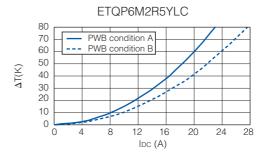


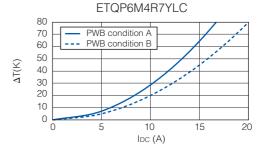










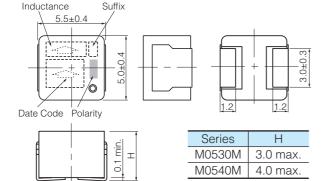




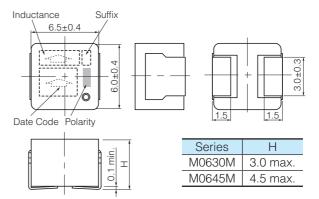
# Dimensions in mm (not to scale)

Dimensional tolerance unless noted: ±0.5

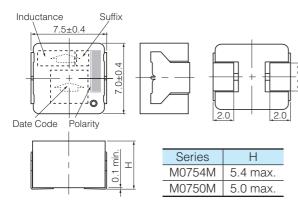
#### Series PCC-M0530M Series PCC-M0540M (ETQP3MDDDYFP/ETQP4MDDDYFP)



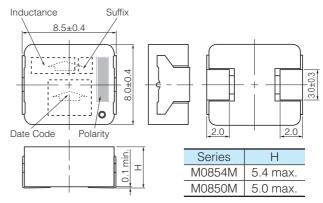
#### Series PCC-M0630M Series PCC-M0645M (ETQP3MDDDYFN/ETQP4MDDDYFN)



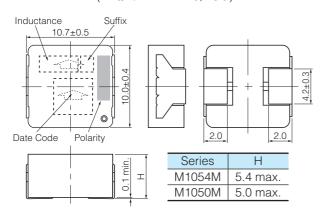
# Series PCC-M0754M Series PCC-M0750M (ETQP5MDDDYFM/YGM)



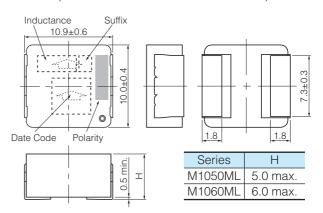
# Series PCC-M0854M Series PCC-M0850M (ETQP5MDDDYFK/YGK)



#### Series PCC-M1054M Series PCC-M1050M (ETQP5MDDDTFC/YGC)



#### Series PCC-M1050ML Series PCC-M1060ML (ETQP5MDDDYLC/ETQP6MDDDYLC)

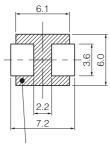




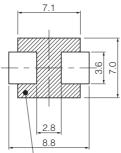
# Recommended Land Pattern in mm (not to scale)

Dimensional tolerance unless noted: ±0.5

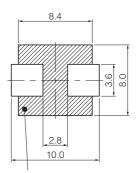
Series PCC-M0530M Series PCC-M0540M (ETQP3MDDDYFP/ETQP4MDDDYFP) Series PCC-M0630M Series PCC-M0645M (ETQP3MDDDYFN/ETQP4MDDDYFN) Series PCC-M0754M Series PCC-M0750M (ETQP5MUUUYFM/YGM)



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

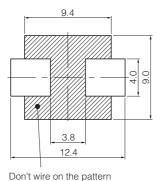


The same as the left



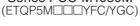
The same as the left.

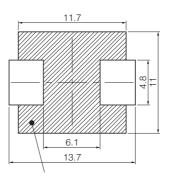
Series PCC-M0854M Series PCC-M0850M (ETQP5MUDUYFK/YGK)



on shaded portion the PWB.

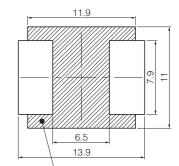
Series PCC-M1054M Series PCC-M1050M





The same as the left.

Series PCC-M1050ML Series PCC-M1060ML (ETQP5MDDDYLC/ETQP6MDDDYLC)



The same as the left.

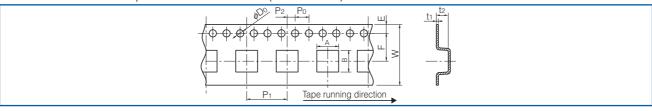
■ As for Soldering Conditions and Safety Precautions (Power Choke Coils (Automotive Grade)),

Please see Data Files



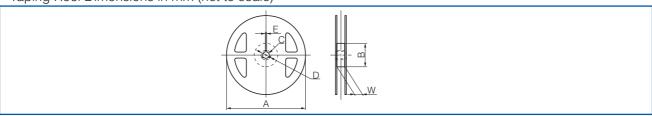
# **Packaging Methods (Taping)**

• Embossed Carrier Tape Dimensions in mm (not to scale)



Series	Α	В	W	Ē	F	P <sub>1</sub>	P <sub>2</sub>	Po	φDo	t <sub>1</sub>	t <sub>2</sub>
PCC-M0530M	5.6	6.1									3.3
PCC-M0540M	3.0	0.1									4.3
PCC-M0630M	7 1	6.6	16.0		7.5	12.0				0.4	3.3
PCC-M0645M	7.1	0.0	10.0	1.75	7.5	12.0	2.0	4.0	1.5	0.4	5.0
PCC-M0754M/M0750M	8.1	7.6									6.0
PCC-M0854M/M0850M	9.1	8.6									0.0
PCC-M1054M/M1050M	10.7	11.9	24.0		11.5	16.0				0.5	6.3
PCC-M1050ML/M1060ML	10.7	11.9	24.0		11.5	10.0				0.5	0.5

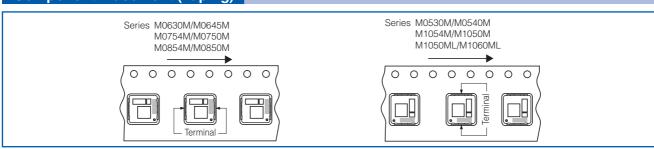
• Taping Reel Dimensions in mm (not to scale)



#### Standard Reel Dimensions

Series	А	В	С	D	Е	W
PCC-M0530M/M0540M PCC-M0630M/M0645M PCC-M0754M/M0750M PCC-M0854M/M0850M	330	100	13	21	2	17.5
PCC-M1054M/M1050M PCC-M1050ML/M1060ML						25.5

# **Component Placement (Taping)**



# **Standard Packing Quantity/Reel**

Series	Part No.	Minimum Quantity / Packing Unit	Quantity per reel	
PCC-M0530M	ETQP3M□□□YFP			
PCC-M0540M	ETQP4M□□□YFP	2,000 pcs. / box (2 reel)	1,000 pcs.	
PCC-M0630M	ETQP3M□□□YFN			
PCC-M0645M	ETQP4M□□□YFN			
PCC-M0754M	ETQP5M□□□YFM			
PCC-M0750M	ETQP5M□□□YGM			
PCC-M0854M	ETQP5M□□□YFK			
PCC-M0850M	ETQP5M□□□YGK	1,000 pcs. / box (2 reel)	500 pcs.	
PCC-M1054M	ETQP5M□□□YFC			
PCC-M1050M	ETQP5M□□□YGC			
PCC-M1050ML	ETQP5M□□□YLC			
PCC-M1060ML	ETQP6M□□□YLC			