Medium Power Film Capacitors

FPG (FPH RoHS Compliant)

PROTECTION

Metallized polypropylene dielectric capacitor with controlled self-healing.

Reinforced metallization on margins developed for high impulse currents.

Axial connections specially developed to reduce series inductance and to provide rigid mechanical mounting.

APPLICATIONS

Protection of gate turn-off thyristor (G.T.O.).

Medium frequency tuning.

HOT SPOT TEMPERATURE CALCULATION

See Hot Spot Temperature page 3.

$$\theta_{hot\ spot} = \theta_{terminals} + (P_d + P_t) \times R_{th}$$

with

P_d (Dielectric losses) = $Q \times tg\delta_0$

$\Rightarrow [\frac{1}{2} \times C_n \times (V_{peak\ to\ peak})^2 \times f] \times (2 \times 10^{-4})$

P_t (Thermal losses) = $R_s \times (I_{rms})^2$

where

C_n	in Farads
V	in Volts
I_{rms}	in Amperes
R_s	in Ohms
f	in Hertz
θ	in °C
R_{th}	in °C/W

Due to the design of the capacitor and its technology, the thermal impedance between the terminations and the core of the capacitor is low, it is necessary to take care that the capacitor is never overheated by use of incorrect sized connections.

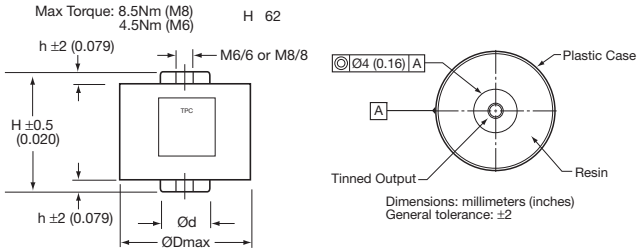
In the case where the series diodes are screwed to the capacitor, cooling of the diodes must be taken in account.

Do not use the capacitor as a heat sink.

Due to the complexity of the diode/capacitor thermal exchanges, we recommend that thermal measurements shall be made on the different components. We would be pleased to advise you on specific problems.

DIMENSIONS

millimeters (inches)



MARKING

Logo

Withstanding surge voltage

Capacitance and tolerance in clear

Nominal DC voltage in clear

RMS current in clear

Date of manufacture (IEC coding)

PACKAGING MATERIAL

Cylindrical in plastic case filled with thermosetting resin.

Outputs: threaded inserts either M6 or M8.

WORKING TEMPERATURE

(according to the power to be dissipated) -40°C to +85°C

HOW TO ORDER

FPG	8	6	R	0105	J	– –
Series	**Case Size**	**Dielectric**	**Voltage Code**	**Capacitance Code**	**Capacitance Tolerances**	**Terminal Code**
FPG = Standard FPH = RoHS Compliant	Case Size 8	6 = Polypropylene	R = 1500V N = 2000V P = 2500V W = 2600V X = 3500V Z = 4500V Y = 4600V	0 + pF code 0105 = 1.0µF 0405 = 4.0µF 0604 = 0.6µF etc.	J = ±5%	– – = Standard

Not RoHS Compliant

RoHS COMPLIANT

Please select correct termination style.

ELECTRICAL CHARACTERISTICS

Capacitance range C_n	0.12µF to 6µF
Tolerance on C_n	±5%
Rated DC voltage $V_n$dc Peak voltage V_{peak} Allowable overvoltage V_s (for 10 s/day)	800 to 3000 V 1200 to 4000 V 1500 to 4600 V
Nominal RMS voltage $V_n$dc	500 to 1400 V
Stray inductance	≈ 10 nH
RMS current	I_{rms} max. = up to 80 A The currents shown in the tables are maximum. It is necessary to respect the thermal limits of the dielectric 85°C see "Hot spot temperature calculation"
Insulation resistance	R_i x C ≥ 30,000 s
Impulse current	I^2.t max. given in the tables Spikes or peak currents in the capacitors may cause a deterioration of the bonding between the metallization and the connections. These bonds are capable of withstanding only a limited amount of energy for each spike. The table shows the maximum energy permitted in the form (I^2.t), where I is in Ampere, and t is in seconds.

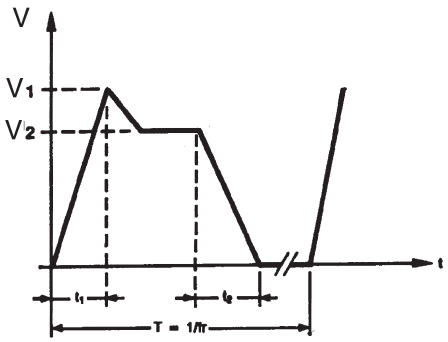
Note: The formula (I^2.t) replaces dV/dt which is less easy to use as it is not an expression of energy (I = C.dV/dt). This type of capacitor has been designed to withstand high (I^2.t) values.

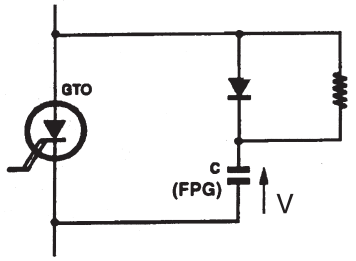
Variation of capacitance with temperature	$\frac{\Delta C}{C}$ ≤ ±2% between -40 and 85°C
Climatic category	40/085/56 (IEC 60068)
Test voltage between terminals @ 25°C	V_s during 10s
Test voltage between terminals and case @ 25°C (Type test)	@ 4 kVrms @ 50 Hz during 1 min.
Dielectric	Polypropylene

PROTECTION

APPLICATION NOTES

G.T.O. PROTECTION





FPG: Snubber capacitor

Choice of voltage: $V_1 \leq V_{peak}$
$V_2 \leq V_n$dc
Maximum overvoltage ≤ V_s (10 s/day)

Nominal DC voltage ($V_n$dc) and peak voltage (V_{peak}) are given in the table of values.

Medium Power Film Capacitors

FPG (FPH RoHS Compliant) Table of Values

PROTECTION

Dimensions: millimeters (inches)

Part Number	Cn (µF)	Dimensions					I^2t max. (A^2s)	I_{rms} max. (A)	Rs (mΩ)	Rth (°C/W)	Typical Weight (g)
		Case Style	H* ±0.5 (±0.020)	h ±2 (±0.079)	D max.	d ±0.5 (±0.020)					
FPG 1500V $V_n$dc = 800V V_{peak} = 1200V V_{rms} = 500V V_s = 1500V (Voltage Code R)											
FPG66R0105J--	1	Plastic Case M6/6	52 (2.047)	5 (0.197)	40 (1.575)	18 (0.709)	2	15	2.4	14	120
FPG66R0155J--	1.5	Plastic Case M6/6	52 (2.047)	5 (0.197)	55 (2.165)	18(0.709)	4.6	20	1.6	10.5	160
FPG86R0205J--	2	Plastic Case M8/8	52 (2.047)	5 (0.197)	60 (2.362)	22 (0.866)	8	30	1.2	6.1	190
FPG86R0305J--	3	Plastic Case M8/8	52 (2.047)	5 (0.197)	72 (2.835)	22 (0.866)	18	45	0.9	4.5	260
FPG86R0355J--	3.5	Plastic Case M8/8	52 (2.047)	5 (0.197)	72 (2.835)	22 (0.866)	25	50	0.85	4.5	260
FPG86R0405J--	4	Plastic Case M8/8	52 (2.047)	5 (0.197)	82 (1.575)	22 (0.866)	32	60	0.75	3.5	320
FPG86R0505J--	5	Plastic Case M8/8	52 (2.047)	5 (0.197)	82 (3.622)	22 (0.866)	50	70	0.65	2.5	320
FPG86R0605J--	6	Plastic Case M8/8	52 (2.047)	5 (0.197)	92 (3.622)	22 (0.866)	73	75	0.6	2.5	400
FPG 2000V Vndc = 1000V Vpeak = 1600V Vrms = 600V Vs = 2000V (Voltage Code N)											
FPG66N0504J--	0.5	Plastic Case M6/6	52 (2.047)	5 (0.197)	40 (1.575)	18 (0.709)	1	15	3	14	120
FPG86N0105J--	1	Plastic Case M8/8	52 (2.047)	5 (0.197)	60 (2.362)	22 (0.866)	3	20	2.3	10.5	190
FPG86N0155J--	1.5	Plastic Case M8/8	52 (2.047)	5 (0.197)	60 (2.362)	22 (0.866)	7	30	1.5	6.1	190
FPG86N0205J--	2	Plastic Case M8/8	52 (2.047)	5 (0.197)	72 (2.835)	22 (0.866)	12.7	40	1.1	4.5	260
FPG86N0255J--	2.5	Plastic Case M8/8	52 (2.047)	5 (0.197)	72 (2.835)	22 (0.866)	20	60	0.89	3.7	260
FPG86N0305J--	3	Plastic Case M8/8	52 (2.047)	5 (0.197)	82 (3.228)	22 (0.866)	28	60	0.85	3.2	320
FPG86N0355J--	3.5	Plastic Case M8/8	52 (2.047)	5 (0.197)	82 (3.228)	22 (0.866)	39	65	0.78	2.9	320
FPG86N0405J--	4	Plastic Case M8/8	52 (2.047)	5 (0.197)	92 (3.622)	22 (0.866)	50	70	0.7	2.5	400
FPG 2500V Vndc = 1300V Vpeak = 2000V Vrms = 700V Vs = 2500V (Voltage Code P)											
FPG66P0474J--	0.47	Plastic Case M6/6	62 (2.441)	5 (0.197)	40 (1.575)	18 (0.709)	0.7	15	6	25	160
FPG66P0105J--	1	Plastic Case M6/6	62 (2.441)	5 (0.197)	55 (2.165)	18 (0.709)	2	18	3	13	180
FPG66P0155J--	1.5	Plastic Case M6/6	62 (2.441)	5 (0.197)	60 (2.362)	22 (0.866)	4.5	25	2	10	220
FPG86P0205J--	2	Plastic Case M8/8	62 (2.441)	5 (0.197)	72 (2.835)	22 (0.866)	8	35	1.5	6.5	310
FPG86P0255J--	2.5	Plastic Case M8/8	62 (2.441)	5 (0.197)	72 (2.835)	22 (0.866)	12.5	40	1.3	4.8	310
FPG86P0305J--	3	Plastic Case M8/8	62 (2.441)	5 (0.197)	82 (3.228)	22 (0.866)	18	50	1.15	4.4	410
FPG86P0405J--	4	Plastic Case M8/8	62 (2.441)	5 (0.197)	92 (3.622)	22 (0.866)	32	65	0.95	3.4	475
FPG 2600V Vndc = 1750V Vpeak = 2000V Vrms = 800V Vs = 2600V (Voltage Code W)											
FPG66W0474J--	0.47	Plastic Case M6/6	62 (2.441)	5 (0.197)	40 (1.575)	18 (0.709)	1.4	12	4.04	28	160
FPG66W0105J--	1	Plastic Case M6/6	62 (2.441)	5 (0.197)	55 (2.165)	18 (0.709)	5.7	21	2.17	10.9	180
FPG66W0155J--	1.5	Plastic Case M6/6	62 (2.441)	5 (0.197)	60 (2.362)	18 (0.709)	12.9	31	1.55	7.7	220
FPG86W0205J--	2	Plastic Case M8/8	62 (2.441)	5 (0.197)	72 (2.835)	22 (0.866)	23	41	1.24	6.1	310
FPG86W0255J--	2.5	Plastic Case M8/8	62 (2.441)	5 (0.197)	82 (3.228)	22 (0.866)	36	51	1.05	4.5	410
FPG86W0305J--	3	Plastic Case M8/8	62 (2.441)	5 (0.197)	92 (3.622)	22 (0.866)	50	62	0.92	3.9	475
FPG86W0355J--	3.5	Plastic Case M8/8	62 (2.441)	5 (0.197)	92 (3.622)	22 (0.866)	70	72	0.83	3.4	475
FPG86W0395J--	3.9	Plastic Case M8/8	62 (2.441)	5 (0.197)	92 (3.622)	22 (0.866)	85	80	0.78	3.1	475
FPG 3500V Vndc = 2000V Vpeak = 2400V Vrms = 1000V Vs = 3500V (Voltage Code X)											
FPG66X0334J--	0.33	Plastic Case M6/6	62 (2.441)	5 (0.197)	40 (1.575)	18 (0.709)	2	15	2.5	28	160
FPG66X0504J--	0.5	Plastic Case M6/6	62 (2.441)	5 (0.197)	55 (2.165)	18 (0.709)	5	19	2.5	11.2	180
FPG86X0105J--	1	Plastic Case M8/8	62 (2.441)	5 (0.197)	72 (2.835)	22 (0.866)	15	38	1.4	6.2	310
FPG86X0155J--	1.5	Plastic Case M8/8	62 (2.441)	5 (0.197)	82 (3.228)	22 (0.866)	40	56	1.03	3.9	410
FPG86X0205J--	2	Plastic Case M8/8	62 (2.441)	5 (0.197)	92 (3.622)	22 (0.866)	70	75	0.85	3.1	475
FPG 4500V Vndc = 2500V Vpeak = 3200V Vrms = 1200V Vs = 4500V (Voltage Code Z)											
FPG66Z0224J--	0.22	Plastic Case M6/6	62 (2.441)	5 (0.197)	40 (1.575)	18 (0.709)	1.5	15	3.8	25	160
FPG66Z0474J--	0.47	Plastic Case M6/6	62 (2.441)	5 (0.197)	60 (2.362)	18 (0.709)	7	24	2.16	8.5	220
FPG86Z0684J--	0.68	Plastic Case M8/8	62 (2.441)	5 (0.197)	72 (2.835)	22 (0.866)	14	35	1.59	6.2	310
FPG86Z0105J--	1	Plastic Case M8/8	62 (2.441)	5 (0.197)	82 (3.228)	22 (0.866)	30	52	1.18	4	410
FPG86Z1254J--	1.25	Plastic Case M8/8	62 (2.441)	5 (0.197)	92 (3.622)	22 (0.866)	50	65	1	3.3	475
FPG 4600 V Vndc = 3000 V Vpeak = 4000 V Vrms = 1400 V Vs = 4600 V (Voltage Code Y)											
FPG66Y0124J--	0.12	Plastic Case M6/6	62 (2.441)	5 (0.197)	40 (1.575)	18 (0.709)	0.8	15	6	28	160
FPG66Y0224J--	0.22	Plastic Case M6/6	62 (2.441)	5 (0.197)	60 (2.362)	18 (0.709)	3	20	3.48	11	220
FPG86Y0334J--	0.33	Plastic Case M8/8	62 (2.441)	5 (0.197)	72 (2.835)	22 (0.866)	6.8	25	2.42	7.7	310
FPG86Y0474J--	0.47	Plastic Case M8/8	62 (2.441)	5 (0.197)	82 (3.228)	22 (0.866)	13.8	35	1.79	5.2	410
FPG86Y0604J--	0.60	Plastic Case M8/8	62 (2.441)	5 (0.197)	92 (3.622)	22(0.866)	22	45	1.47	4.2	475