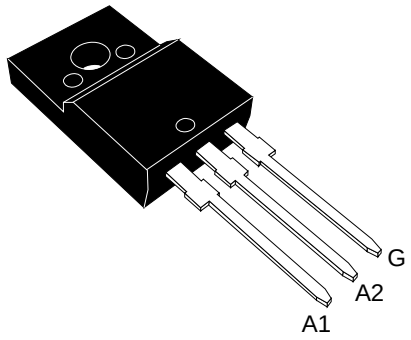
T405T-6FP

4 A logic level Triac

Datasheet - production data



TO-220FPAB

Features

- Three triggering quadrants Triac
- V_{DRM} / V_{RRM} = 600 V
- UL certified device rated 2000 V_{RMS} (ref. file E81734)
- ECOPACK®2 compliant component
- Halogen-free molding, lead-free plating

Applications

- General purpose AC inductive loads
- Induction motor control circuits
- Small home appliances

Benefits

- Low gate consumption
- Direct drive from microcontroller
- Direct mounting on heat sink

Description

Based on ST's logic level technology providing high commutation performance, this device is suitable for use on AC low current loads. It is recommended for motor driving, electro valves, kitchen appliances, power tools and dishwashers. Available in a fully insulated package, it complies with standard UL1557.

Table 1: Device summary

Symbol	Value	Unit
$I_{T(RMS)}$	4	A
V_{DRM}/V_{RRM}	600	V
I_{GT}	5	mA
T_j max.	125	°C
Package	TO-220FPAB	
Ordering code	T405T-6FP	

1 Characteristics

Table 2: Absolute maximum ratings (limiting values)

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (full sine wave)		T_c = 104 °C	4	A
I_{TSM}	Non repetitive surge peak on-state current (full sine cycle)	t_p = 16.7 ms	T_j initial = 25 °C	31	A
		t_p = 20 ms		30	
I^2t	I^2t value for fusing	t_p = 10 ms	T_j initial = 25 °C	5.1	A^2s
dI/dt	Critical rate of rise of on-state current	I_G = 2 x I_{GT}, $t_r \leq$ 100 ns	f = 120 Hz	50	A/µs
I_{GM}	Peak gate current	t_p = 20 µs	T_j = 125 °C	4	A
P_{GM}	Maximum gate power dissipation			1	W
T_{stg}	Storage junction temperature range			-40 to +150	°C
T_j	Operating junction temperature range			-40 to +125	°C
T_L	Maximum lead temperature for soldering during 10 s			260	°C
V_{ins}	Insulation RMS voltage (60 seconds)			2000	V

Table 3: Static electrical characteristics

Symbol	Test conditions	T_j		Value	Unit
V_{TM}	I_{TM} = 5.5 A, t_p = 380 µs	25 °C	Max.	1.56	V
V_{TO}	threshold on-state voltage	125 °C	Max.	0.9	V
R_D	Dynamic resistance	125 °C	Max.	100	mΩ
I_{DRM} I_{RRM}	V_D = V_{DRM}, V_R = V_{RRM}	25 °C	Max.	5	µA
		125 °C	Max.	1	mA

Table 4: Dynamic characteristics

Symbol	Parameter	Quadrant	T_j		Value	Unit
I_{GT}(1)	V_D = 12 V, R_L = 30 Ω	I - II - III	25 °C	Max.	5	mA
V_{GT}				Max.	1.3	V
V_{GD}	V_D = V_{DRM}, R_L = 3.3 kΩ		125 °C	Min.	0.2	V
I_L	I_G = 1.2 x I_{GT}		25 °C	Max.	15	mA
I_H	I_{TM} = 100 mA			Max.	10	
dV/dt(2)	V_D = V_R = 402 V, gate open		125 °C	Min.	20	V/µs
(dI/dt)c(2)	(dV/dt)c = 0.1 V/µs			Min.	1.8	A/ms

Notes:

(1)Minimum I_{GT} is guaranteed at 5 % of I_{GT} max.

(2)For both polarities of A2 referenced to A1

Table 5: Thermal resistance

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Max. junction to case thermal resistance (AC)	4.3	°C/W
$R_{th(j-a)}$	Typical junction to ambient thermal resistance	60	

1.1 Characteristics (curves)

Figure 1: Maximum power dissipation versus on-state RMS current

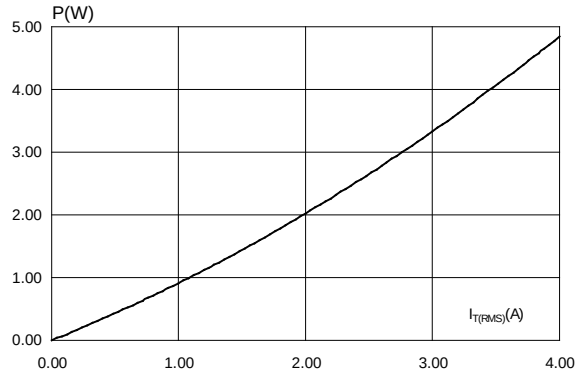


Figure 2: RMS on-state current versus temperature under tab. (full cycle)

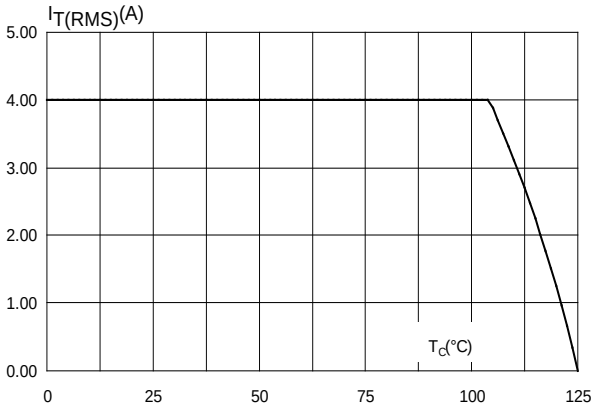


Figure 3: RMS on-state current versus ambient temperature (free air convection)

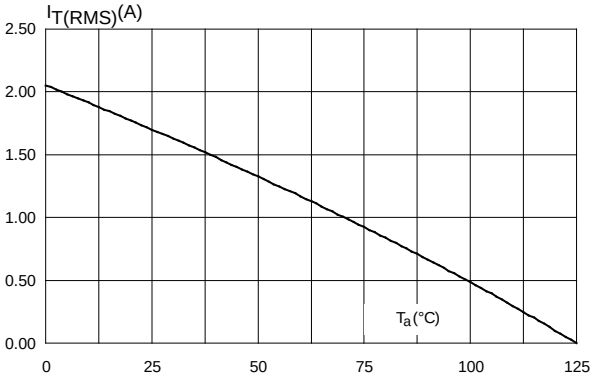


Figure 4: Relative variation of thermal impedance versus pulse duration

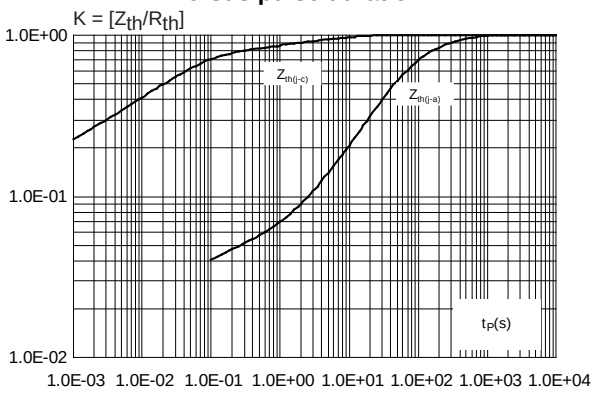


Figure 5: On-state characteristics (maximum values)

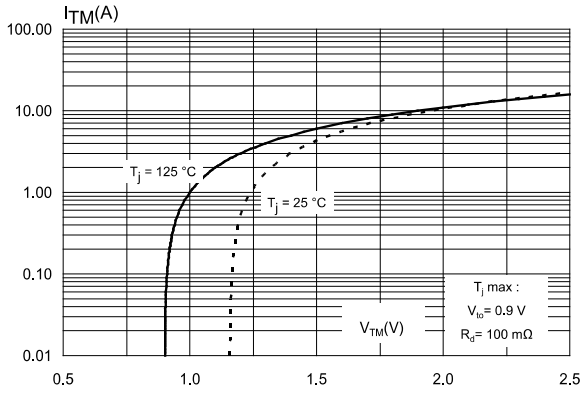


Figure 6: Surge peak on-state current versus number of cycles

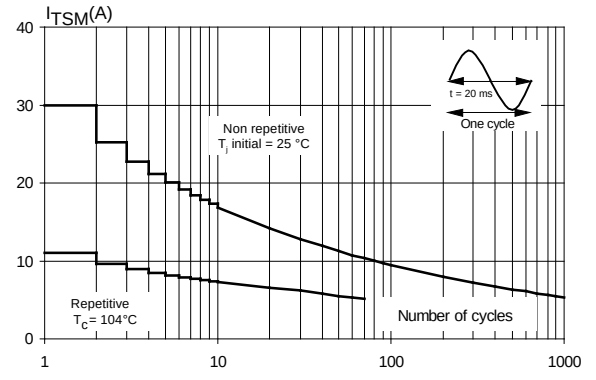


Figure 7: Non repetitive surge peak on-state current for a sinusoidal pulse with width t_p < 10 ms

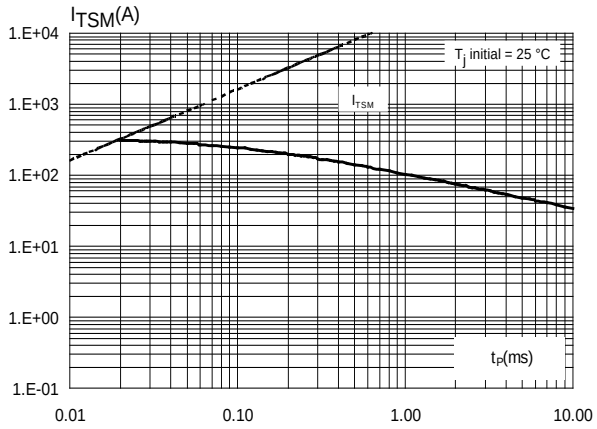


Figure 8: Relative variation of gate trigger current and gate trigger voltage versus junction temperature (typical values)

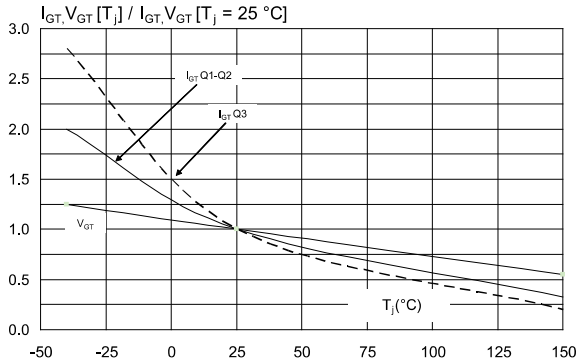


Figure 9: Relative variation of holding current and latching current versus junction temperature (typical values)

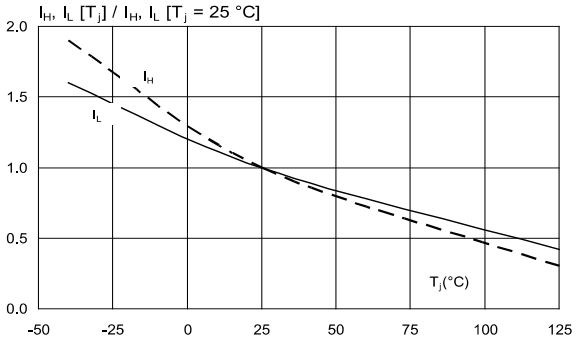


Figure 10: Relative variation of critical rate of decrease of main current (dI/dt)c versus reapplied (dV/dt)c

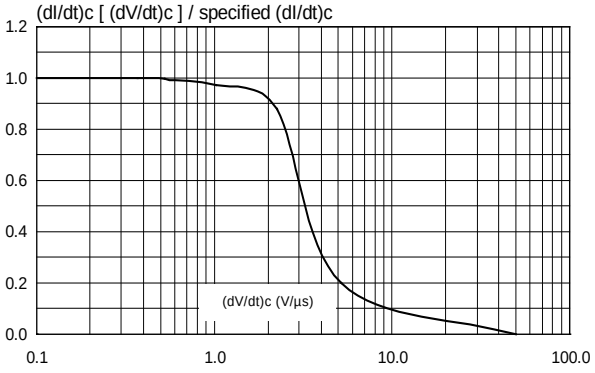


Figure 11: Relative variation of critical rate of decrease of main current versus junction temperature (typical values)

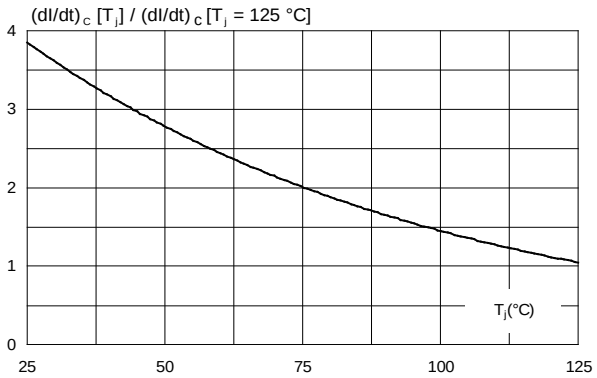
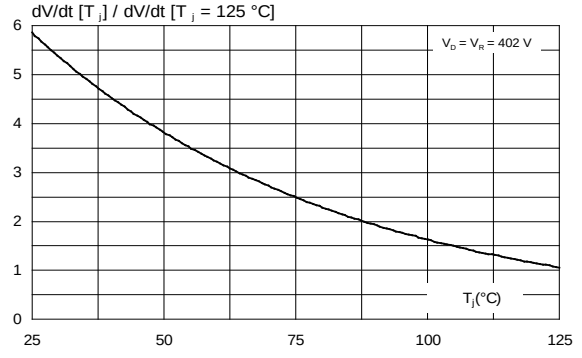


Figure 12: Relative variation of static dV/dt immunity versus junction temperature



2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: ***www.st.com***. ECOPACK® is an ST trademark.

- ECOPACK®2 compliant
- Lead-free package leads finishing
- Molding compound resin is halogen-free and meets UL94 level V0
- Recommended torque (for through-hole package): 0.4 to 0.6 N·m

2.1 TO-220FPAB package information

Figure 13: TO-220FPAB package outline

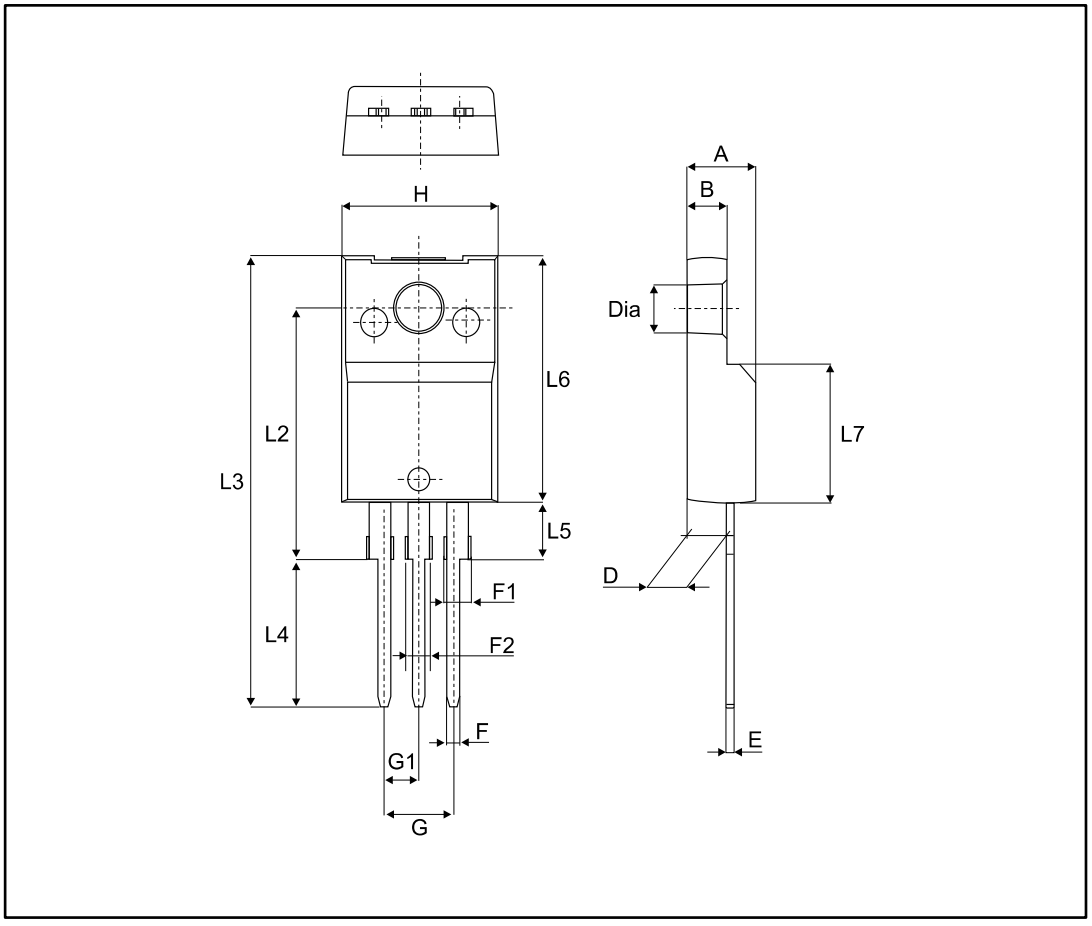


Table 6: TO-220FPAB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.1739	0.1818
B	2.5	2.7	0.0988	0.1067
D	2.50	2.75	0.0988	0.1087
E	0.45	0.70	0.0178	0.0277
F	0.75	1.0	0.0296	0.0395
F1	1.15	1.70	0.0455	0.0672
F2	1.15	1.70	0.0455	0.0672
G	4.95	5.20	0.1957	0.2055
G1	2.40	2.70	0.0949	0.1067
H	10.00	10.40	0.3953	0.4111
L2	16.00 typ.		0.6324 typ.	
L3	28.60	30.60	1.1304	1.2095
L4	9.80	10.6	0.3874	0.4190
L5	2.90	3.60	0.1146	0.1423
L6	15.90	16.40	0.6285	0.6482
L7	9.00	9.30	0.3557	0.3676
Dia	3.0	3.20	0.1186	0.1265

3 Ordering information

Figure 14: Ordering information scheme

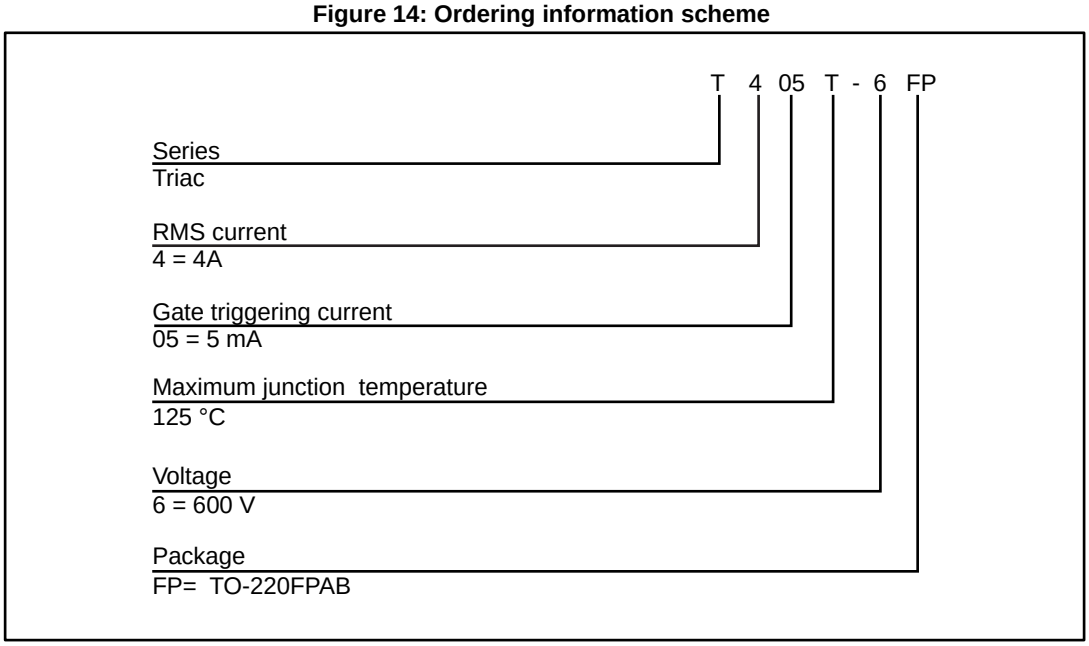


Table 7: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
T405T-6FP	T405T-6FP	TO-220FPAB	2.0 g	50	Tube

4 Revision history

Table 8: Document revision history

Date	Revision	Changes
04-Nov-2016	1	Inital release.

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