



THE DATASHEET OF ACST4-7CFP





ACST4 Series

ASD™ AC Switch Family

AC POWER SWITCH

MAIN APPLICATIONS

- AC static switching in appliance control systems
- Drive of low power high inductive or resistive loads like
 - spray pump in dishwashers
 - fan in air-conditioners

FEATURES

- Blocking voltage : $V_{DRM} / V_{RRM} = +/-700V$
- Avalanche controlled : $V_{CL\ typ} = 1100 V$
- Nominal conducting current : $I_{T(RMS)} = 4A$
- High surge current capability: 30A for 20ms full wave
- Gate triggering current : $I_{GT} < 10\ mA$ or 25mA
- Switch integrated driver
- High noise immunity : static $dV/dt > 500V/\mu s$

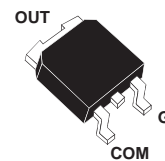
BENEFITS

- Enables equipment to meet IEC 61000-4-5
- High off-state reliability with planar technology
- No external overvoltage protection needed
- Reduces the power component factor
- Interfaces directly with the microcontroller
- Direct interface with the microcontroller for the ACST4-7S ($I_{GT} < 10mA$)

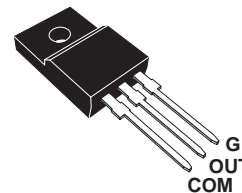
DESCRIPTION

The ACST4 belongs to the AC power switch family built around the ASD™ technology. This high performance device is adapted to home appliances or industrial systems and drives loads up to 4 A.

The ACS™ switch embeds a Triac structure with a high voltage clamping device to absorb the inductive turn-off energy and withstand line transients such as those described in the IEC61000-4-5 standards.

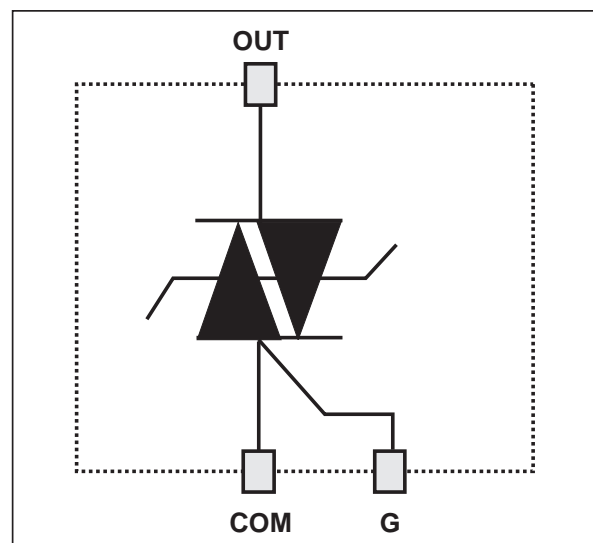


DPAK
ACST4-7SB/CB



TO-220FPAB
ACST4-7SFP/CFP

FUNCTIONAL DIAGRAM



ACST4 Series

ABSOLUTE RATINGS (limiting values)

For either positive or negative polarity of pin OUT voltage in respect to pin COM voltage

| Symbol | Parameter | | Value | Unit |
|---------------------|--|-----------------------|------------------------------|---------------------|
| V_{DRM} / V_{RRM} | Repetitive peak off-state voltage | | $T_j = -10\text{ °C}$ 700 | V |
| $I_{T(RMS)}$ | RMS on-state current full cycle sine wave 50 to 60 Hz | DPAK | $T_c = 110\text{ °C}$ 4 | A |
| | | TO-220FPAB | $T_c = 100\text{ °C}$ | |
| I_{TSM} | Non repetitive surge peak on-state current T_j initial = 25°C, full cycle sine wave | $F = 50\text{ Hz}$ | 30 | A |
| | | $F = 60\text{ Hz}$ | 33 | A |
| I^2t | Fusing capability | | $t_p = 10\text{ms}$ | A ² s |
| di/dt | Repetitive on-state current critical rate of rise $I_G = 10\text{mA}$ ($t_r < 100\text{ns}$) | $T_j = 125\text{ °C}$ | $F = 120\text{ Hz}$ 50 | A/ μs |
| V_{PP} | Non repetitive line peak pulse voltage | | note 1 2 | kV |
| T_{stg} | Storage temperature range | | | - 40 to + 150 °C |
| T_j | Operating junction temperature range | | | - 30 to + 125 °C |
| T_l | Maximum lead soldering temperature during 10s | | | 260 °C |

Note 1: according to test described by IEC61000-4-5 standard & Figure B.

GATE CHARACTERISTICS (maximum values)

| Symbol | Parameter | Value | Unit |
|-------------|---|-------|------|
| $P_{G(AV)}$ | Average gate power dissipation | 0.1 | W |
| P_{GM} | Peak gate power dissipation ($t_p = 20\mu\text{s}$) | 10 | A |
| I_{GM} | Peak gate current ($t_p = 20\mu\text{s}$) | 1 | V |

THERMAL RESISTANCES

| Symbol | Parameter | | Value | Unit |
|---------------|--|-----------------------------|-------|------|
| $R_{th(j-a)}$ | Junction to ambient | $S = 0.5\text{cm}^2$ DPAK | 70 | °C/W |
| | | TO-220FPAB | 60 | °C/W |
| $R_{th(j-l)}$ | Junction to case for full cycle sine wave conduction | DPAK | 2.6 | °C/W |
| | | TO-220FPAB | 4.6 | °C/W |

S = Copper surface under Tab

PARAMETER DESCRIPTION

| Parameter Symbol | Parameter description |
|---------------------|---|
| I_{GT} | Triggering gate current |
| V_{GT} | Triggering gate voltage |
| V_{GD} | Non-triggering gate voltage |
| I_H | Holding current |
| I_L | Latching current |
| V_{TM} | Peak on-state voltage drop |
| V_{TO} | On state threshold voltage |
| R_d | On state dynamic resistance |
| I_{DRM} / I_{RRM} | Maximum forward or reverse leakage current |
| dV/dt | Critical rate of rise of off-state voltage |
| $(dV/dt)_c$ | Critical rate of rise of commutating off-state voltage |
| $(dI/dt)_c$ | Critical rate of decrease of commutating on-state current |
| V_{CL} | Clamping voltage |
| I_{CL} | Clamping current |

ELECTRICAL CHARACTERISTICS

For either positive or negative polarity of pin OUT voltage in respect to pin COM voltage.

| Symbol | Test Conditions | | | | ACST4-7S | ACST4-7C | Unit |
|---------------------|--------------------------------------|-----------------|-------------------|-----|----------|----------|------------|
| I_{GT} | $V_{OUT}=12V$ (DC) $R_L=33\Omega$ | QI - QII - QIII | $T_j=25^\circ C$ | MAX | 10 | 25 | mA |
| V_{GT} | $V_{OUT}=12V$ (DC) $R_L=33\Omega$ | QI - QII - QIII | $T_j=25^\circ C$ | MAX | 1 | 1.1 | V |
| V_{GD} | $V_{OUT}=V_{DRM}$ $R_L=3.3k\Omega$ | | $T_j=125^\circ C$ | MIN | 0.2 | | V |
| I_H | $I_{OUT}=100mA$ gate open | | $T_j=25^\circ C$ | MAX | 20 | 35 | mA |
| I_L | $I_G=2 \times I_{GTmax}$ | | $T_j=25^\circ C$ | MAX | 40 | 60 | mA |
| V_{TM} | $I_{OUT}=5.6A$ $t_p=380\mu s$ | | $T_j=25^\circ C$ | MAX | 1.5 | | V |
| V_{TO} | | | $T_j=125^\circ C$ | MAX | 0.90 | | V |
| R_d | | | $T_j=125^\circ C$ | MAX | 100 | | m Ω |
| I_{DRM} / I_{RRM} | $V_{OUT}=700V$ | | $T_j=25^\circ C$ | MAX | 10 | | μA |
| | | | $T_j=125^\circ C$ | MAX | 500 | | |
| dV/dt | $V_{OUT}=460V$ gate open | | $T_j=110^\circ C$ | MIN | 200 | 500 | V/ μs |
| $(dI/dt)_c$ | $(dV/dt)_c=15V/\mu s$ | | $T_j=125^\circ C$ | MIN | 2.0 | 2.5 | A/ms |
| V_{CL} | $I_{CL}=1mA$ $t_p=1ms$ | | $T_j=25^\circ C$ | TYP | 1100 | | V |

Fig. B: Overvoltage ruggedness test circuit for resistive and inductive loads according to IEC61000-4-5 standards.
 $R = 150\Omega$, $L = 10\mu\text{H}$, $V_{PP} = 2\text{kV}$.

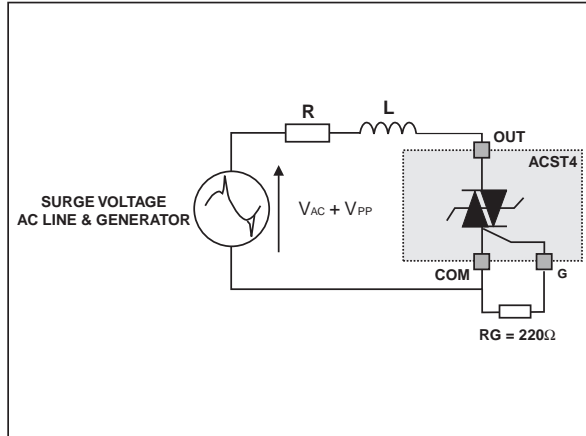


Fig. C: Current and Voltage of the ACST4 during IEC61000-4-5 standard test with R, L & V_{PP} .

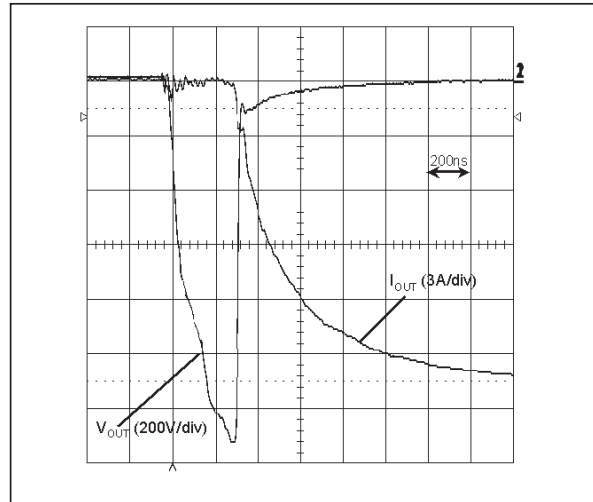


Fig. 1: Maximum power dissipation versus RMS on-state current.

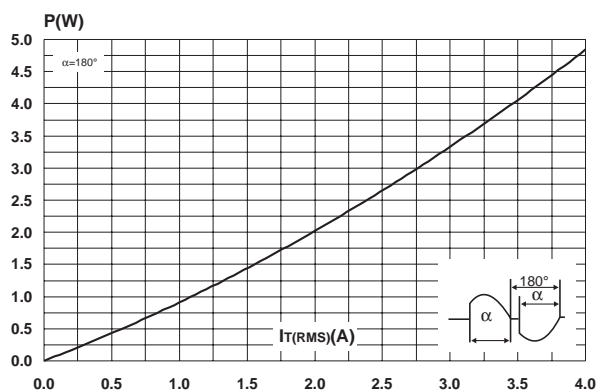


Fig. 2-1: RMS on-state current versus case temperature.

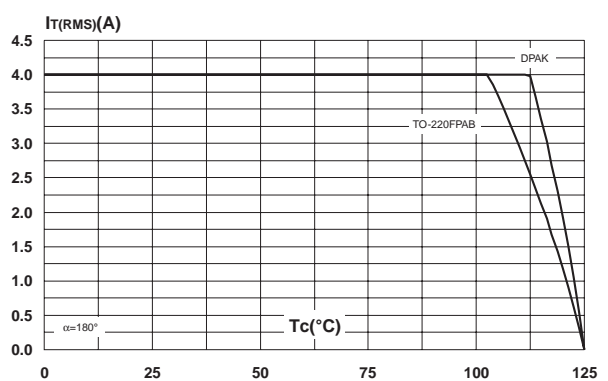


Fig. 2-2: RMS on-state current versus ambient temperature.

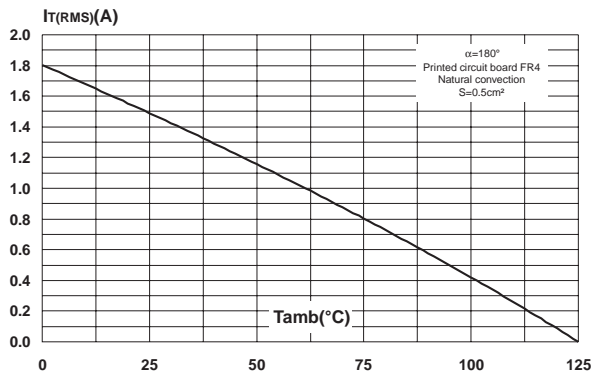


Fig. 3: Relative variation of thermal impedance versus pulse duration.

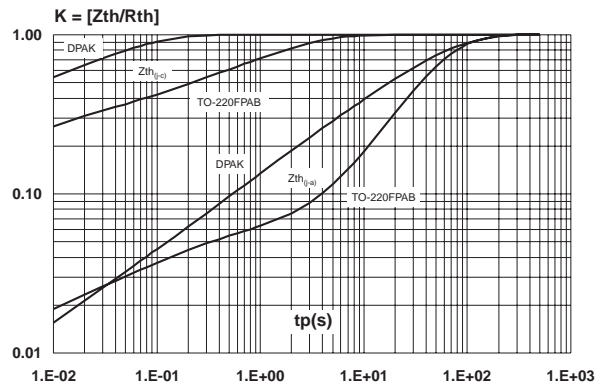


Fig. 4: Relative variation of gate trigger current, holding current and latching versus junction temperature (typical values).

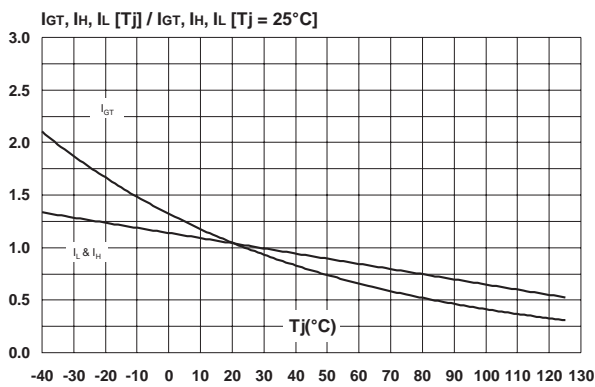


Fig. 5: Relative variation of static dV/dt versus junction temperature.

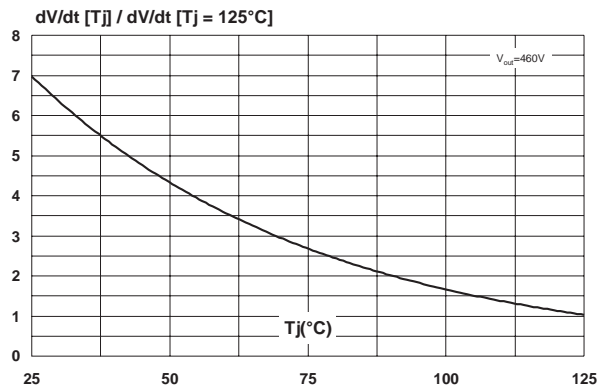


Fig. 6-1: Relative variation of critical rate of decrease of main current versus reapplied dV/dt (typical values).

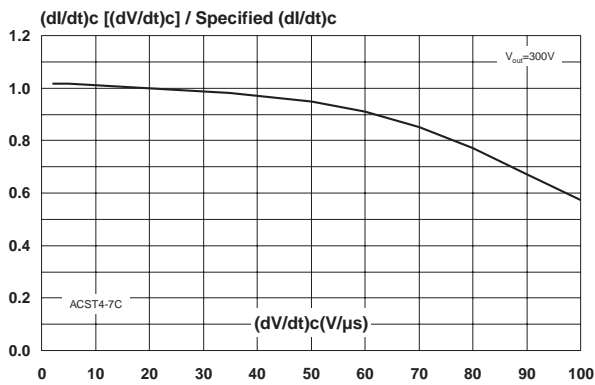


Fig. 6-2: Relative variation of critical rate of decrease of main current versus reapplied dV/dt (typical values).

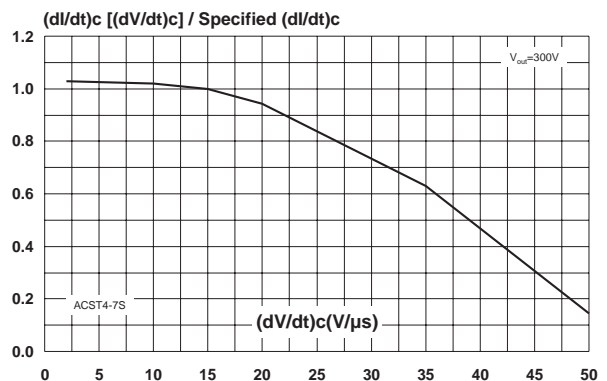


Fig. 7: Relative variation of critical rate of decrease of main current versus junction temperature.

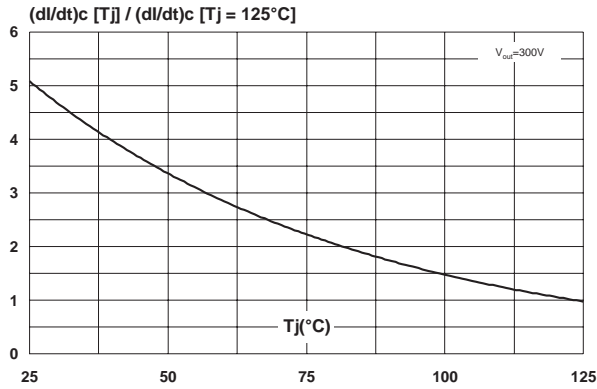


Fig. 8: Surge peak on-state current versus number of cycles.

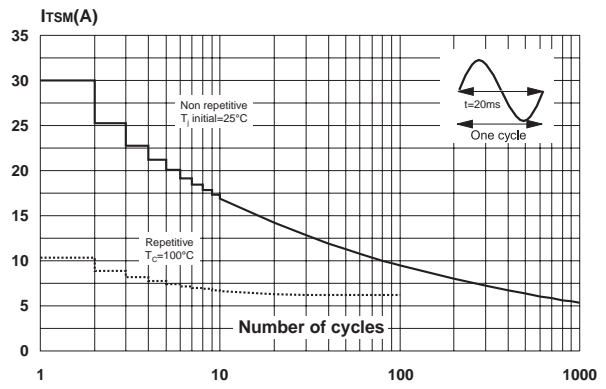


Fig. 9: Non repetitive surge peak on-state current for a sinusoidal pulse with width $t_p < 10\text{ms}$, and corresponding value of I^2t .

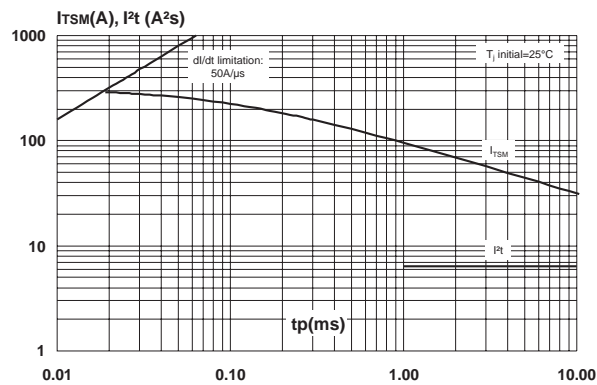


Fig. 10: On-state characteristics (maximum values).

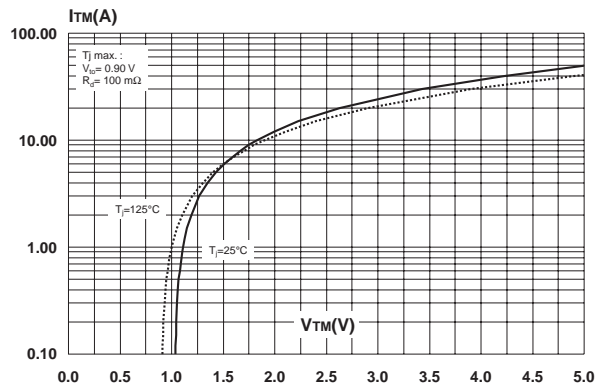
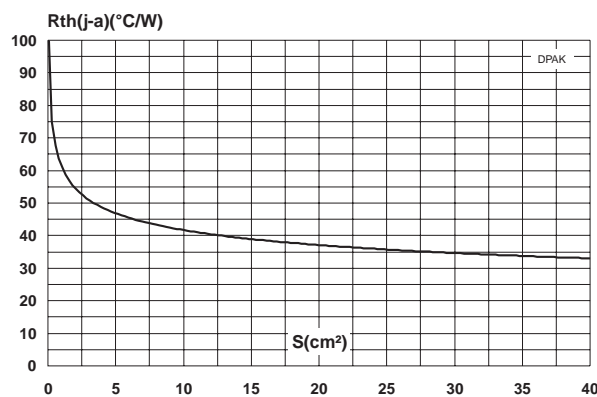
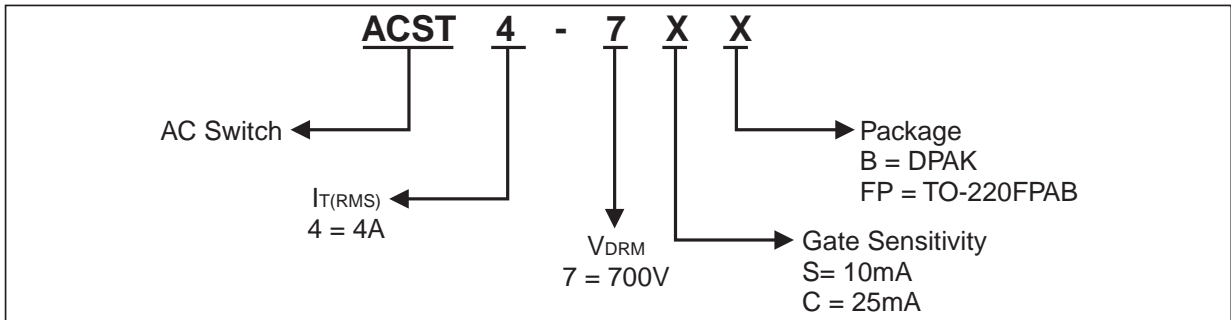


Fig. 11: Thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, copper thickness: $35\mu\text{m}$)

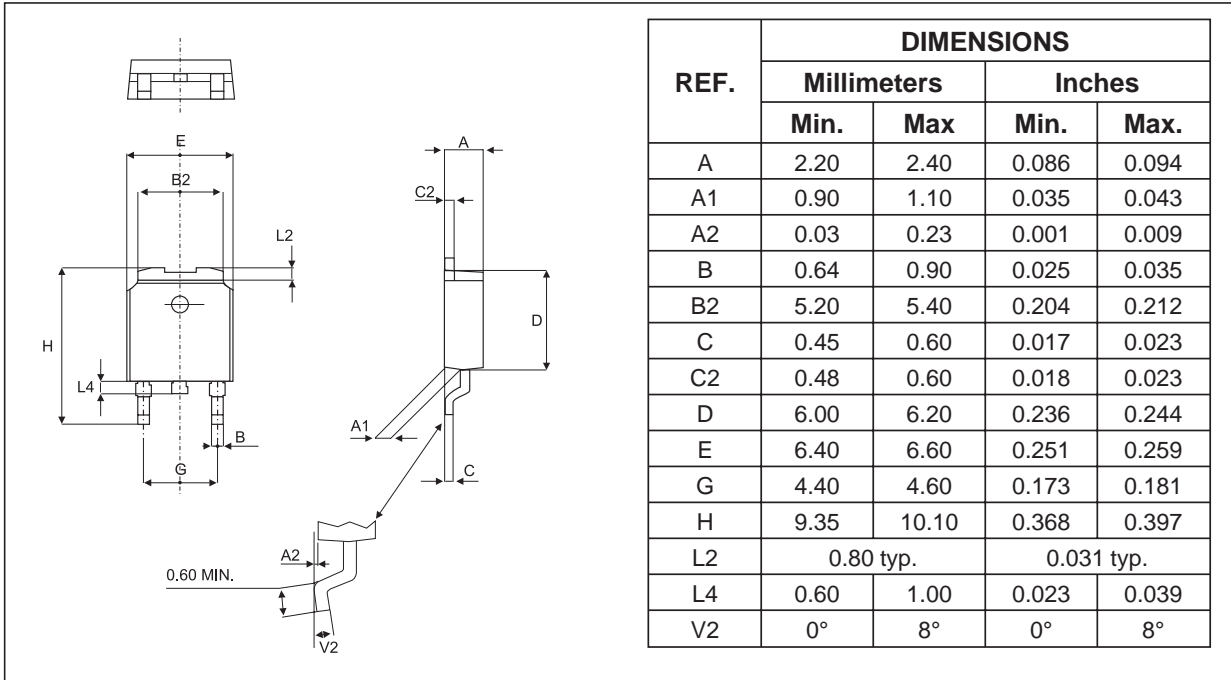


ACST4 Series

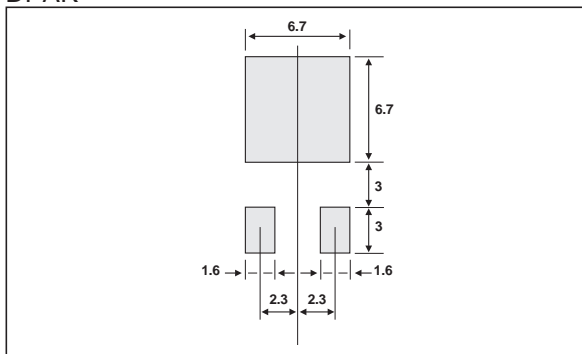
ORDERING INFORMATION



PACKAGE OUTLINE MECHANICAL DATA DPAK



FOOT PRINT DPAK



PACKAGE OUTLINE MECHANICAL DATA
TO-220FPAB

| REF. | DIMENSIONS | | | |
|------|-------------|------|-----------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.4 | 4.6 | 0.173 | 0.181 |
| B | 2.5 | 2.7 | 0.098 | 0.106 |
| D | 2.5 | 2.75 | 0.098 | 0.108 |
| E | 0.45 | 0.70 | 0.018 | 0.027 |
| F | 0.75 | 1 | 0.030 | 0.039 |
| F1 | 1.15 | 1.70 | 0.045 | 0.067 |
| F2 | 1.15 | 1.70 | 0.045 | 0.067 |
| G | 4.95 | 5.20 | 0.195 | 0.205 |
| G1 | 2.4 | 2.7 | 0.094 | 0.106 |
| H | 10 | 10.4 | 0.393 | 0.409 |
| L2 | 16 Typ. | | 0.63 Typ. | |
| L3 | 28.6 | 30.6 | 1.126 | 1.205 |
| L4 | 9.8 | 10.6 | 0.386 | 0.417 |
| L5 | 2.9 | 3.6 | 0.114 | 0.142 |
| L6 | 15.9 | 16.4 | 0.626 | 0.646 |
| L7 | 9.00 | 9.30 | 0.354 | 0.366 |

OTHER INFORMATION

| Ordering type | Marking | Package | Weight | Base qty | Delivery mode |
|---------------|---------|------------|--------|----------|---------------|
| ACST4-7SB | ACST47S | DPAK | 0.3 g | 75 | Tube |
| ACST4-7SB-TR | ACST47S | DPAK | 0.3 g | 2500 | Tape & reel |
| ACST4-7SFP | ACST47S | TO-220FPAB | 2.4 g | 50 | Tube |
| ACST4-7CB | ACST47C | DPAK | 0.3 g | 75 | Tube |
| ACST4-7CB-TR | ACST47C | DPAK | 0.3 g | 2500 | Tape & reel |
| ACST4-7CFP | ACST47C | TO-220FPAB | 2.4 g | 50 | Tube |

- Epoxy meets UL94,V0

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics

© 2003 STMicroelectronics - Printed in Italy - All rights reserved.

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany
 Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore
 Spain - Sweden - Switzerland - United Kingdom - United States.

<http://www.st.com>



Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

- ⊖ [View ACST4-7CFP](#) on WIN SOURCE
- ⊖ [STMicroelectronics](#) Information

Optimize Your Supply Chain with WIN SOURCE Solutions

- ✓ Global Sourcing Solution
- ✓ Obsolete Management
- ✓ Cost Control Management
- ✓ Shortage Management
- ✓ Alternative Solution
- ✓ Excess Inventory Management