

# DATA SHEET

## **C106D** Thyristors logic level

Product specification

July 2001

# Thyristors logic level

C106D

## GENERAL DESCRIPTION

Passivated, sensitive gate thyristor in a plastic envelope, intended for use in general purpose switching and phase control applications. This device is intended to be interfaced directly to microcontrollers, logic integrated circuits and other low power gate trigger circuits.

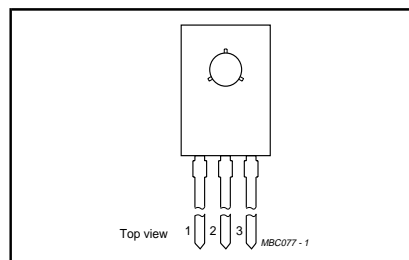
## QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
$V_{DRM}$ $V_{RRM}$	Repetitive peak off-state voltages	400	V
$I_{T(AV)}$	Average on-state current	2.5	A
$I_{T(RMS)}$	RMS on-state current	4	A
$I_{TSM}$	Non-repetitive peak on-state current	38	A

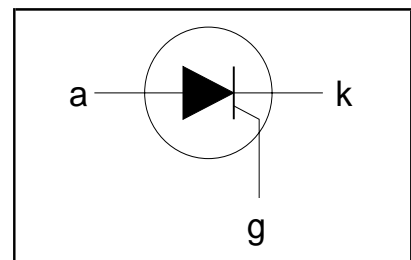
## PINNING - SOT32

PIN	DESCRIPTION
1	cathode
2	anode
3	gate

## PIN CONFIGURATION



## SYMBOL



## LIMITING VALUES

Limiting values in accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{DRM}$ , $V_{RRM}$	Repetitive peak off-state voltages		-	400 <sup>1</sup>	V
$I_{T(AV)}$	Average on-state current	half sine wave; $T_{mb} \leq 113\text{ °C}$	-	2.5	A
$I_{T(RMS)}$	RMS on-state current	all conduction angles	-	4	A
$I_{TSM}$	Non-repetitive peak on-state current	half sine wave; $T_j = 25\text{ °C}$ prior to surge	-	35	A
		$t = 10\text{ ms}$	-	38	A
$I^2t$	$I^2t$ for fusing	$t = 10\text{ ms}$	-	6.1	A <sup>2</sup> s
$dl_T/dt$	Repetitive rate of rise of on-state current after triggering	$I_{TM} = 10\text{ A}$ ; $I_G = 50\text{ mA}$ ; $dl_G/dt = 50\text{ mA}/\mu\text{s}$	-	50	A/ $\mu\text{s}$
$I_{GM}$	Peak gate current		-	2	A
$V_{GM}$	Peak gate voltage		-	5	V
$V_{RGM}$	Peak reverse gate voltage		-	5	V
$P_{GM}$	Peak gate power		-	5	W
$P_{G(AV)}$	Average gate power	over any 20 ms period	-	0.5	W
$T_{stg}$	Storage temperature		-40	150	°C
$T_j$	Operating junction temperature		-	125 <sup>2</sup>	°C

<sup>1</sup> Although not recommended, off-state voltages up to 800V may be applied without damage, but the thyristor may switch to the on-state. The rate of rise of current should not exceed 15 A/ $\mu\text{s}$ .

<sup>2</sup> Note: Operation above 110°C may require the use of a gate to cathode resistor of 1k $\Omega$  or less.

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**THERMAL RESISTANCES**

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{thj-mb}$	Thermal resistance junction to mounting base	in free air	-	-	2.5	K/W
$R_{thj-a}$	Thermal resistance junction to ambient		-	-	95	K/W

**STATIC CHARACTERISTICS** $T_j = 25\text{ °C}$  unless otherwise stated

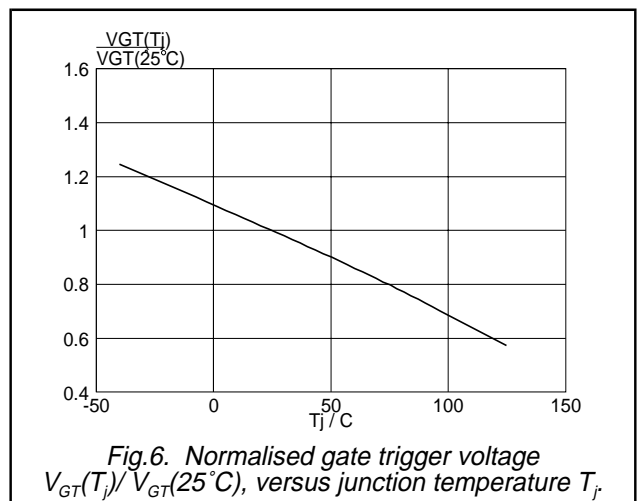
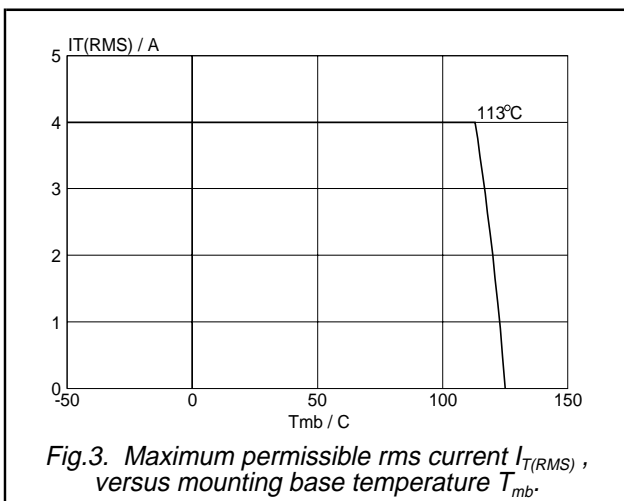
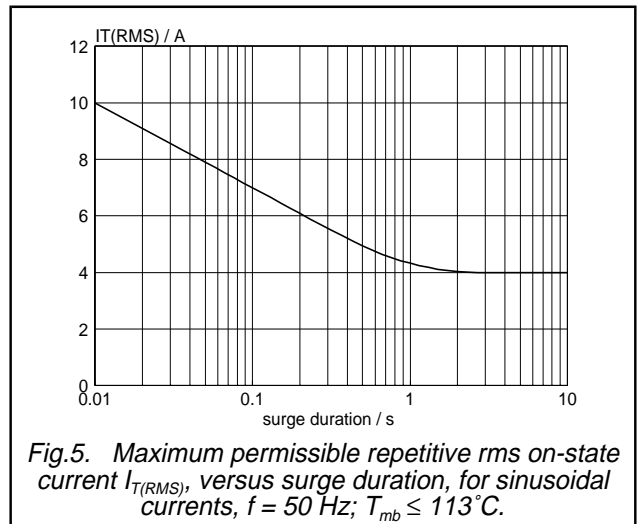
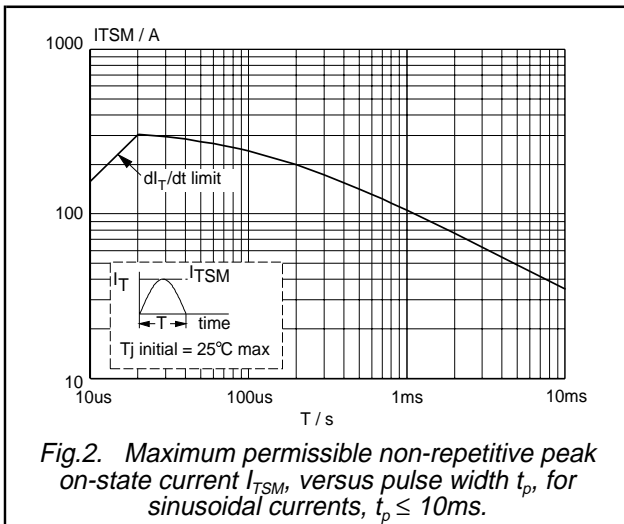
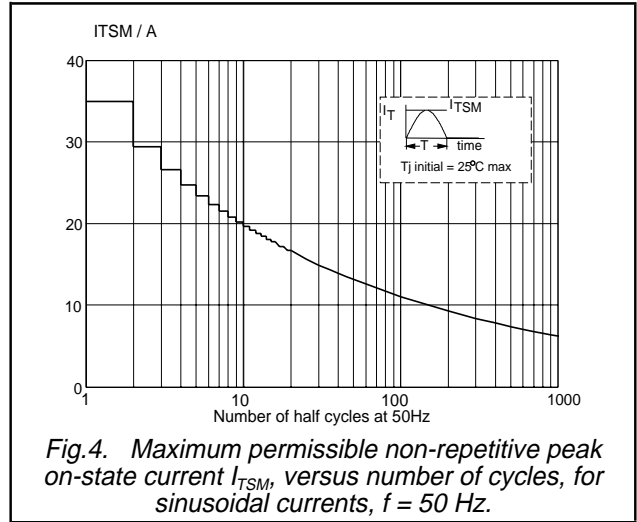
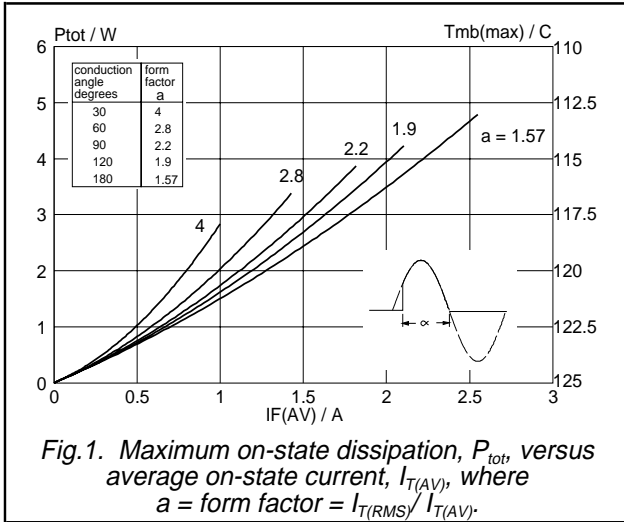
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{GT}$	Gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$	-	15	200	$\mu\text{A}$
$I_L$	Latching current	$V_D = 12\text{ V}$ ; $I_{GT} = 0.1\text{ A}$	-	0.17	10	mA
$I_H$	Holding current	$V_D = 12\text{ V}$ ; $I_{GT} = 0.1\text{ A}$	-	0.10	6	mA
$V_T$	On-state voltage	$I_T = 5\text{ A}$	-	1.23	1.8	V
$V_{GT}$	Gate trigger voltage	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$	-	0.4	1.5	V
$I_D, I_R$	Off-state leakage current	$V_D = V_{DRM(max)}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 110\text{ °C}$	0.1	0.2	-	V
		$V_D = V_{DRM(max)}$ ; $V_R = V_{RRM(max)}$ ; $T_j = 125\text{ °C}$	-	0.1	0.5	mA

**DYNAMIC CHARACTERISTICS** $T_j = 25\text{ °C}$  unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$dV_D/dt$	Critical rate of rise of off-state voltage	$V_{DM} = 67\% V_{DRM(max)}$ ; $T_j = 125\text{ °C}$ ; exponential waveform; $R_{GK} = 100\ \Omega$	-	50	-	V/ $\mu\text{s}$
$t_{gt}$	Gate controlled turn-on time	$I_{TM} = 10\text{ A}$ ; $V_D = V_{DRM(max)}$ ; $I_G = 5\text{ mA}$ ; $dI_G/dt = 0.2\text{ A}/\mu\text{s}$	-	2	-	$\mu\text{s}$
$t_q$	Circuit commutated turn-off time	$V_D = 67\% V_{DRM(max)}$ ; $T_j = 125\text{ °C}$ ; $I_{TM} = 8\text{ A}$ ; $V_R = 10\text{ V}$ ; $dI_{TM}/dt = 10\text{ A}/\mu\text{s}$ ; $dV_D/dt = 2\text{ V}/\mu\text{s}$ ; $R_{GK} = 1\text{ k}\Omega$	-	100	-	$\mu\text{s}$

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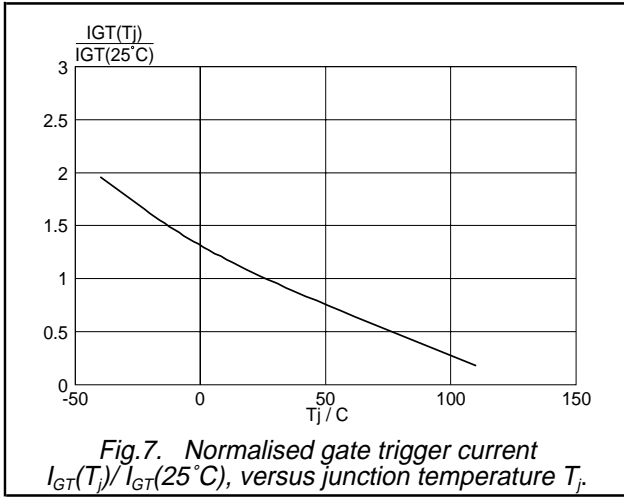


Fig.7. Normalised gate trigger current  $I_{GT}(T_j) / I_{GT}(25^\circ\text{C})$ , versus junction temperature  $T_j$ .

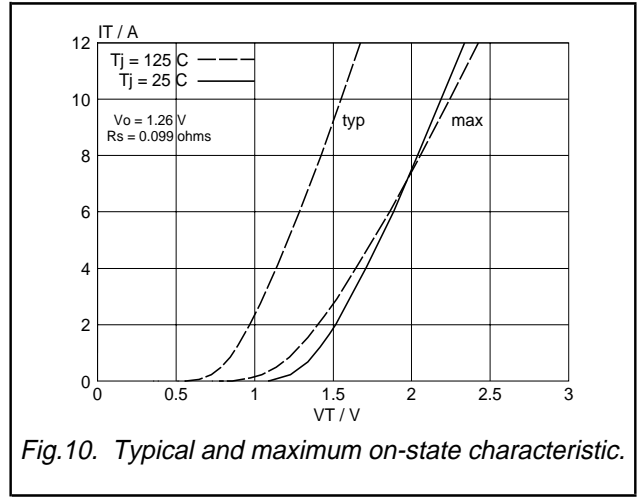


Fig.10. Typical and maximum on-state characteristic.

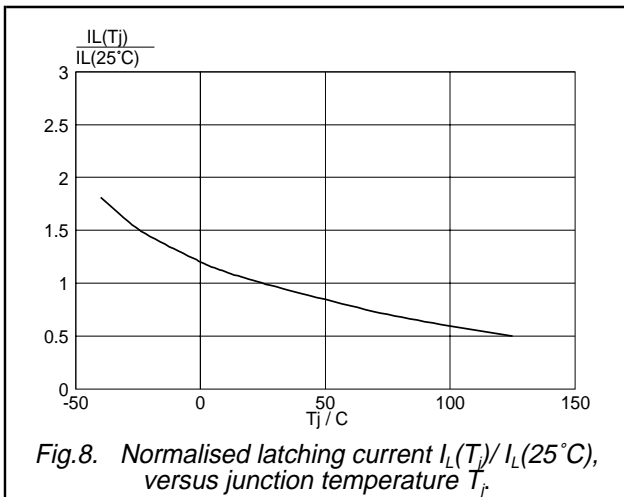


Fig.8. Normalised latching current  $I_L(T_j) / I_L(25^\circ\text{C})$ , versus junction temperature  $T_j$ .

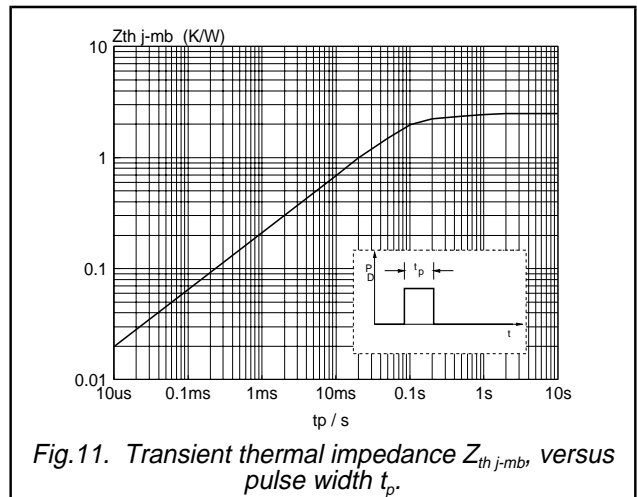


Fig.11. Transient thermal impedance  $Z_{th\ j-mb}$ , versus pulse width  $t_p$ .

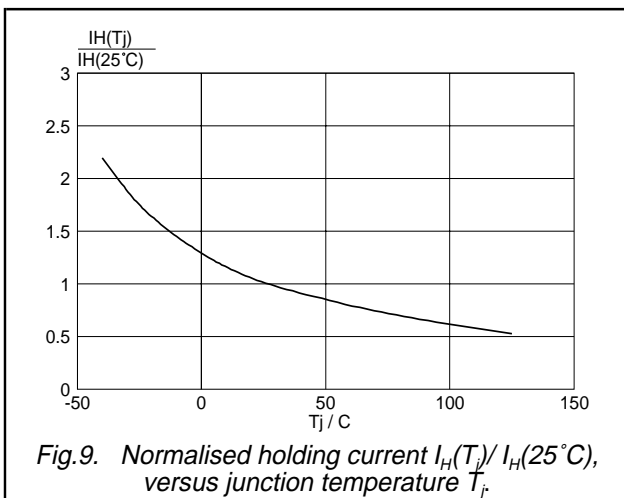


Fig.9. Normalised holding current  $I_H(T_j) / I_H(25^\circ\text{C})$ , versus junction temperature  $T_j$ .

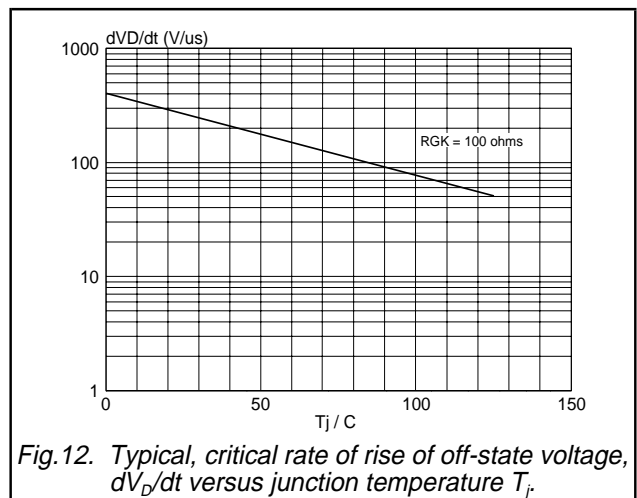


Fig.12. Typical, critical rate of rise of off-state voltage,  $dV_D/dt$  versus junction temperature  $T_j$ .

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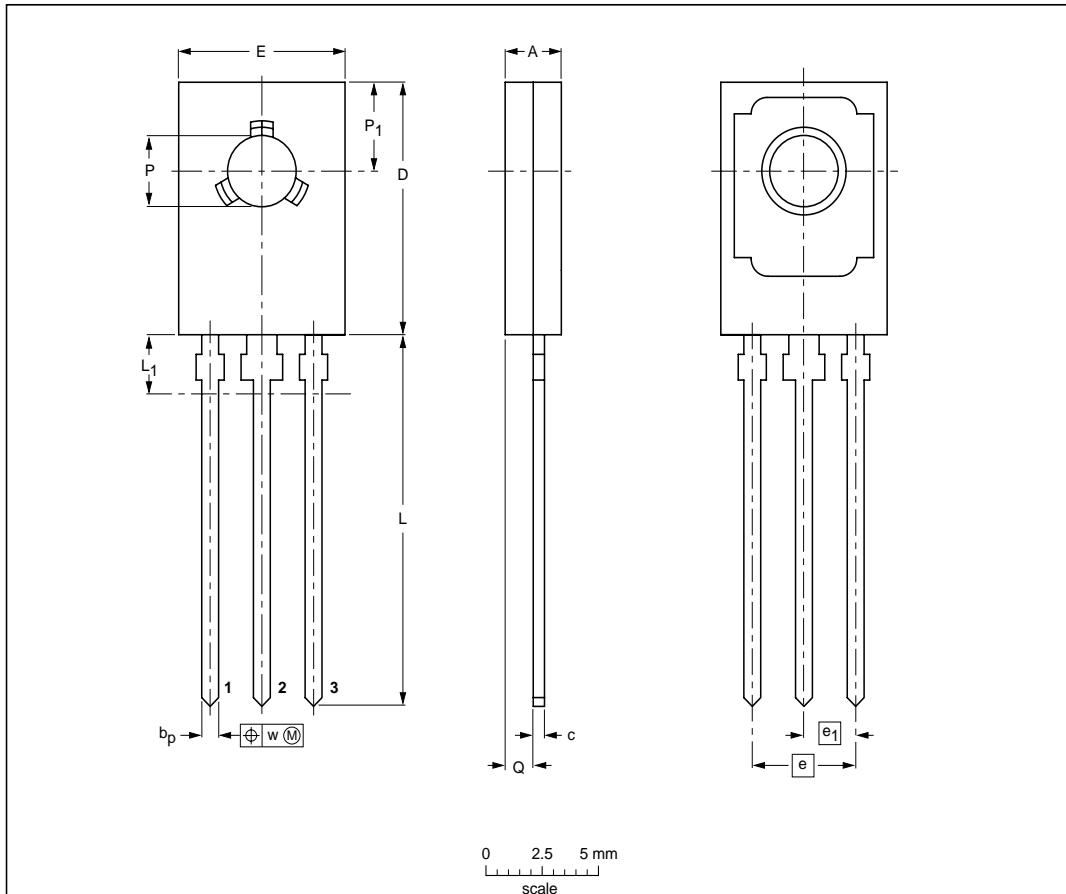
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**MECHANICAL DATA**

Dimensions in mm

Net Mass: 0.8 g

Plastic single-ended leaded (through hole) package; mountable to heatsink, 1 mounting hole; 3 leads SOT32



DIMENSIONS (mm are the original dimensions)

UNIT	A	b <sub>p</sub>	c	D	E	e	e <sub>1</sub>	L	L <sub>1</sub> <sup>(1)</sup> max	Q	P	P <sub>1</sub>	w
mm	2.7 2.3	0.88 0.65	0.60 0.45	11.1 10.5	7.8 7.2	4.58	2.29	16.5 15.3	2.54	1.5 0.9	3.2 3.0	3.9 3.6	0.254

Note

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ		
SOT32		TO-126			97-03-04

Fig.13. SOT32.

**Notes**

1. Refer to mounting instructions for SOT32 envelopes.
2. Epoxy meets UL94 V0 at 1/8".

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**DEFINITIONS**

<b>DATA SHEET STATUS</b>		
<b>DATA SHEET STATUS<sup>3</sup></b>	<b>PRODUCT STATUS<sup>4</sup></b>	<b>DEFINITIONS</b>
Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice
Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product
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<b>Limiting values</b>		
Limiting values are given in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of this specification is not implied. Exposure to limiting values for extended periods may affect device reliability.		
<b>Application information</b>		
Where application information is given, it is advisory and does not form part of the specification.		
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