

## Silicon Diffused Power Transistor

BUW14

## GENERAL DESCRIPTION

High-voltage, high-speed, glass passivated npn power transistor in a SOT82 envelope intended for use in converters, inverters, switching regulators, motor control systems and switching applications.

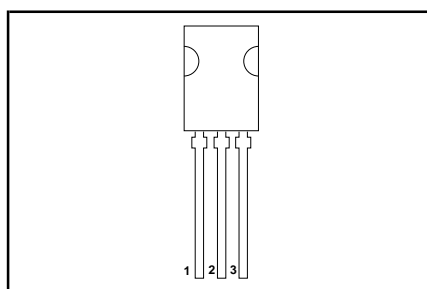
## QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$V_{CESM}$	Collector-emitter voltage peak value	$V_{BE} = 0\text{ V}$	-	1000	V
$V_{CEO}$	Collector-emitter voltage (open base)		-	450	V
$I_C$	Collector current (DC)		-	0.5	A
$I_{CM}$	Collector current peak value		-	1	A
$P_{tot}$	Total power dissipation	$T_{mb} \leq 60\text{ °C}$	-	20	W
$t_f$	Fall time		0.4	-	$\mu\text{s}$

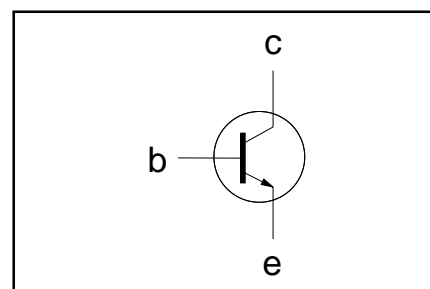
## PINNING - SOT82

PIN	DESCRIPTION
1	emitter
2	collector
3	base

## PIN CONFIGURATION



## SYMBOL



## LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CESM}$	Collector-emitter voltage peak value	$V_{BE} = 0\text{ V}$	-	1000	V
$V_{CEO}$	Collector-emitter voltage (open base)		-	450	V
$I_C$	Collector current (DC)		-	0.5	A
$I_{CM}$	Collector current peak value		-	1	A
$I_B$	Base current (DC)		-	0.2	A
$I_{BM}$	Base current peak value		-	0.3	A
$-I_{BM}$	Reverse base current peak value <sup>1</sup>		-	0.3	A
$P_{tot}$	Total power dissipation	$T_{mb} \leq 60\text{ °C}$	-	20	W
$T_{stg}$	Storage temperature		-65	150	$^{\circ}\text{C}$
$T_j$	Junction temperature		-	150	$^{\circ}\text{C}$

## THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$R_{th\ j-mb}$	Junction to mounting base	-	-	4.5	K/W
$R_{th\ j-a}$	Junction to ambient	in free air	100	-	K/W

<sup>1</sup> Turn-off current.

Silicon Diffused Power Transistor

BUW14

**STATIC CHARACTERISTICS**

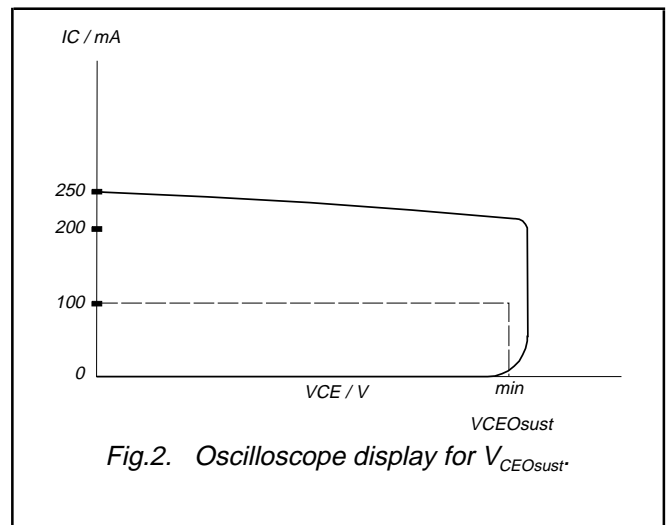
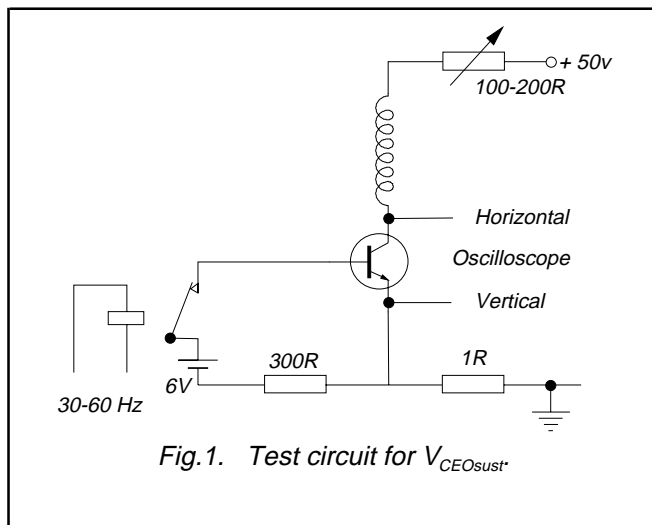
$T_{mb} = 25\text{ }^\circ\text{C}$  unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CES}$	Collector cut-off current <sup>2</sup>	$V_{BE} = 0\text{ V}; V_{CE} = V_{CESMmax}$	-	-	100	$\mu\text{A}$
$I_{CES}$		$V_{BE} = 0\text{ V}; V_{CE} = V_{CESMmax}$ $T_j = 125\text{ }^\circ\text{C}$	-	-	1.0	$\text{mA}$
$I_{EBO}$	Emitter cut-off current	$V_{EB} = 5\text{ V}; I_C = 0\text{ A}$	-	-	1.0	$\text{mA}$
$V_{CEOsust}$	Collector-emitter sustaining voltage	$I_B = 0\text{ A}; I_C = 100\text{ mA};$ $L = 25\text{ mH}$	450	-	-	$\text{V}$
$V_{CEsat}$	Collector-emitter saturation voltages	$I_C = 0.1\text{ A}; I_B = 10\text{ mA}$	-	-	0.8	$\text{V}$
$V_{CEsat}$		$I_C = 0.2\text{ A}; I_B = 20\text{ mA}$	-	-	1.0	$\text{V}$
$V_{BEsat}$	Base-emitter saturation voltage	$I_C = 0.2\text{ A}; I_B = 20\text{ mA}$	-	-	1.0	$\text{V}$
$h_{FE}$	DC current gain	$I_C = 50\text{ mA}; V_{CE} = 5\text{ V}$	-	50	-	
$h_{FE}$		$I_C = 300\text{ mA}; V_{CE} = 5\text{ V}$	25	50	100	

**DYNAMIC CHARACTERISTICS**

$T_{mb} = 25\text{ }^\circ\text{C}$  unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$f_T$	Transition frequency	$I_C = 0.2\text{ A}; V_{CE} = 10\text{ V}; f = 1\text{ MHz}$	20	-	$\text{MHz}$
$t_{on}$	Turn-on time	$I_{Con} = 0.2\text{ A}; I_{Bon} = 20\text{ mA};$ $-I_{Boff} = 40\text{ mA}; V_{CC} = 250\text{ V}$  $T_{mb} = 95\text{ }^\circ\text{C}$	0.4	0.7	$\mu\text{s}$
$t_s$	Turn-off storage time		3.5	5.0	$\mu\text{s}$
$t_f$	Turn-off fall time		0.4	-	$\mu\text{s}$
$t_f$	Turn-off fall time		-	1.3	$\mu\text{s}$



2 Measured with half sine-wave voltage (curve tracer).

Silicon Diffused Power Transistor

BUW14

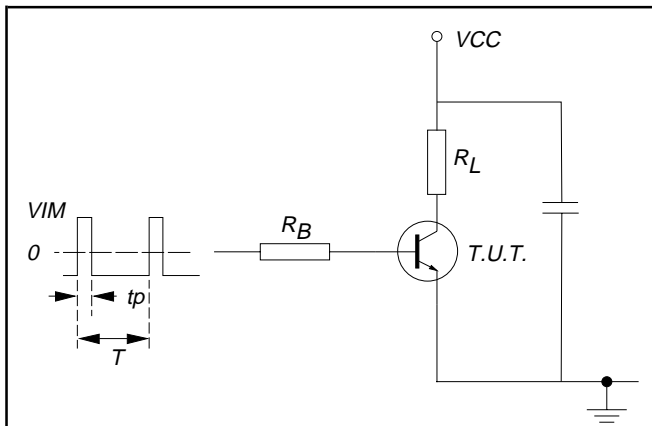


Fig.3. Test circuit resistive load.  $V_{IM} = -6$  to  $+8$  V  
 $V_{CC} = 150$  V;  $tp = 20 \mu s$ ;  $\delta = tp / T = 0.01$ .  
 $R_B$  and  $R_L$  calculated from  $I_{Con}$  and  $I_{Bon}$  requirements.

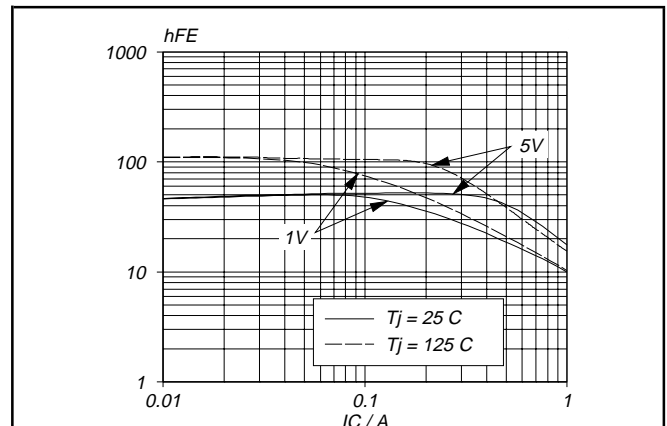


Fig.6. Typical DC current gain.  $h_{FE} = f(I_C)$   
 parameter  $V_{CE}$

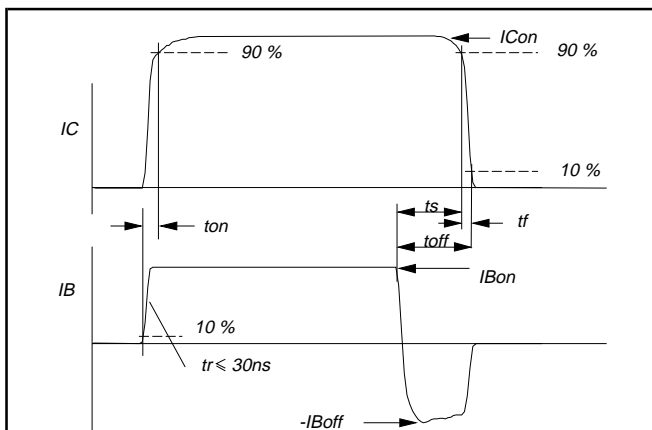


Fig.4. Switching times waveforms with resistive load.

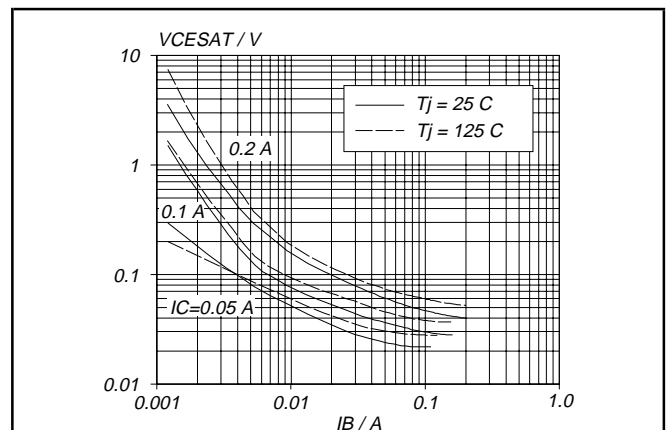


Fig.7. Typical collector-emitter saturation voltage.  
 $V_{CEsat} = f(I_B)$ ; parameter  $I_C$

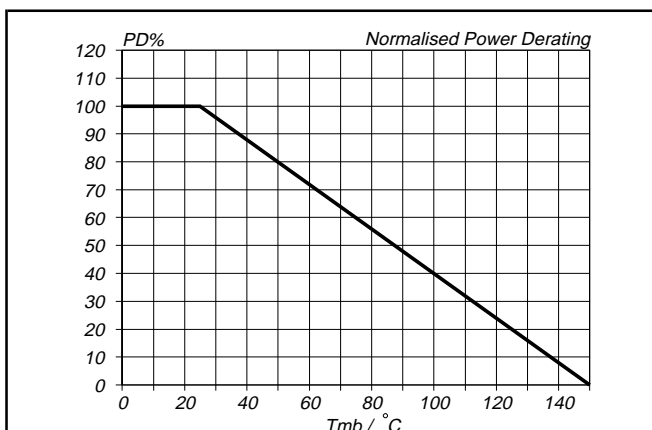


Fig.5. Normalised power dissipation.  
 $PD\% = 100 \cdot P_D / P_{D25^\circ C} = f(T_{mb})$

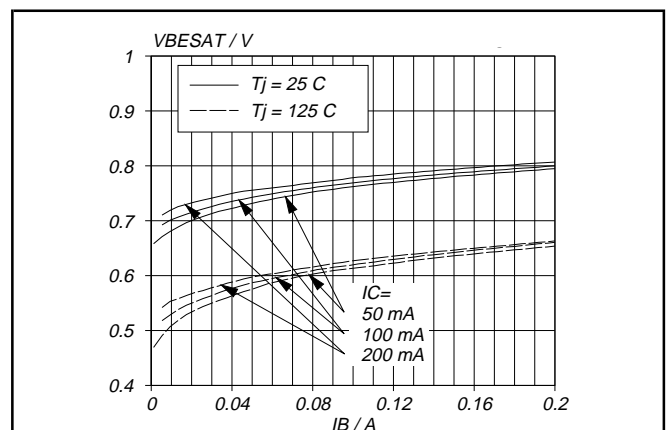


Fig.8. Typical base-emitter saturation voltage.  
 $V_{BEsat} = f(I_B)$ ; parameter  $I_C$

Silicon Diffused Power Transistor

BUW14

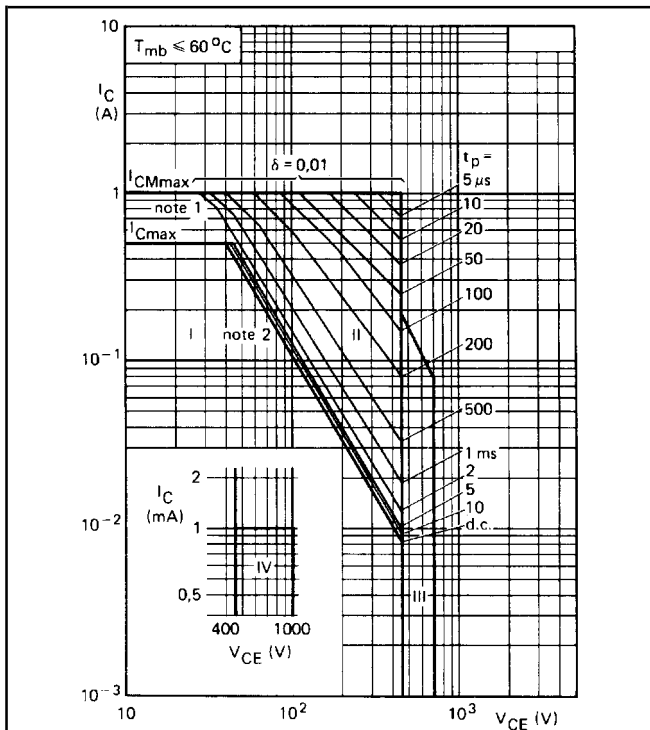


Fig. 9. Forward bias safe operating area.

- (1)  $P_{tot}$  max line.
- (2) Second-breakdown limits.
- I Region of permissible DC operation.
- II Permissible extension for repetitive pulse operation.
- III Area of permissible operation during turn-on in single transistor converters, provided  $R_{BE} \leq 100 \Omega$  and  $t_p \leq 0.6 \mu s$ .
- IV Repetitive pulse operation in this region is permissible provided  $V_{BE} \leq 0$  and  $t_p \leq 2 ms$ .

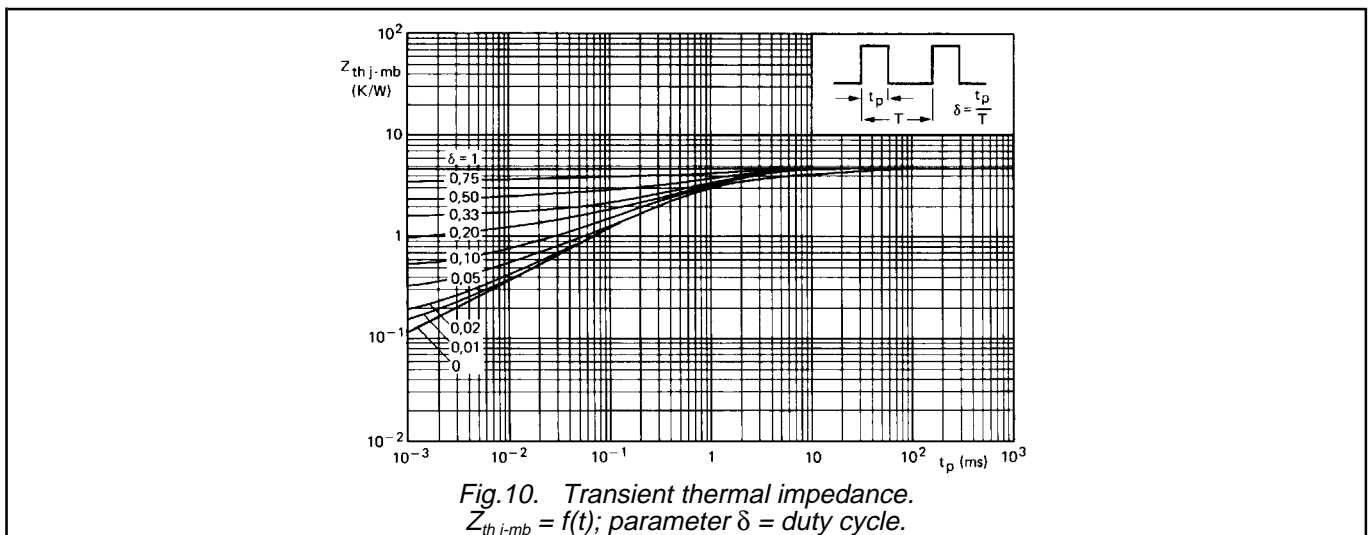
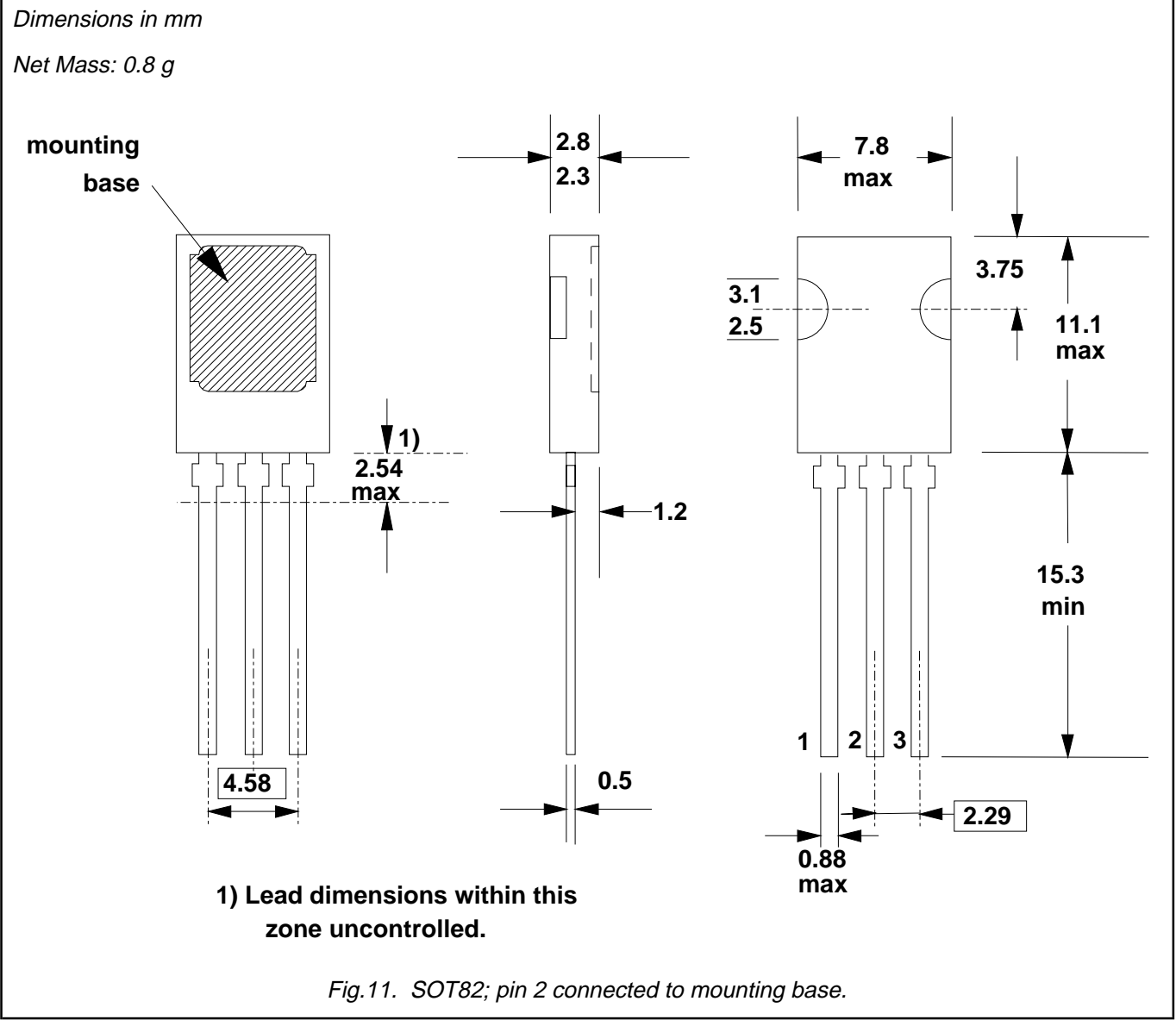


Fig. 10. Transient thermal impedance.  
 $Z_{th j-mb} = f(t)$ ; parameter  $\delta =$  duty cycle.

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**MECHANICAL DATA**



**Notes**

- 1. Refer to mounting instructions for SOT82 envelopes.
- 2. Epoxy meets UL94 V0 at 1/8".

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**DEFINITIONS**

<b>Data sheet status</b>	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
<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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