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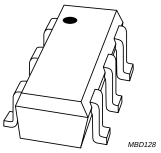


PMGD370XN

Dual N-channel μTrenchMOS™ extremely low level FET

Rev. 01 — 27 February 2004 **Product data**

1. Product profile

1.1 Description

Dual N-channel enhancement mode field-effect transistor in a plastic package using TrenchMOS™ technology.

1.2 Features

- Surface mounted package
- Dual device
- Low on-state resistance
- Footprint 40% smaller than SOT23
- Fast switching
- Low threshold voltage.

1.3 Applications

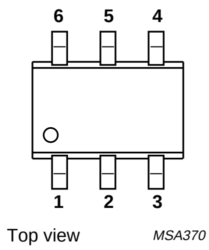
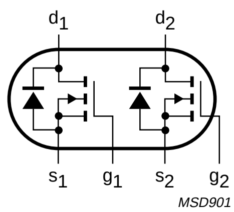
- Driver circuits
- Switching in portable appliances.

1.4 Quick reference data

- $V_{DS} \leq 30$ V
- $P_{tot} \leq 0.41$ W
- $I_D \leq 0.74$ A
- $R_{DSon} \leq 440$ mΩ.

2. Pinning information

Table 1: Pinning - SOT363 (SC-88), simplified outline and symbol

Pin	Description	Simplified outline	Symbol
1	source (s1)		
2	gate (g1)		
3	drain (d2)		
4	source (s2)		
5	gate (g2)		
6	drain (d1)		

SOT363 (SC-88)

PHILIPS

3. Ordering information

Table 2: Ordering information

Type number	Package		
	Name	Description	Version
PMGD370XN	SC-88	Plastic surface mounted package; 6 leads	SOT363

4. Limiting values

Table 3: Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	drain-source voltage (DC)	25 °C ≤ T_j ≤ 150 °C	-	30	V
V_{DGR}	drain-gate voltage (DC)	25 °C ≤ T_j ≤ 150 °C; R_{GS} = 20 kΩ	-	30	V
V_{GS}	gate-source voltage (DC)		-	±12	V
I_D	drain current (DC)	T_{sp} = 25 °C; V_{GS} = 4.5 V; Figure 2 and 3	-	0.74	A
		T_{sp} = 100 °C; V_{GS} = 4.5 V; Figure 2	-	0.47	A
I_{DM}	peak drain current	T_{sp} = 25 °C; pulsed; t_p ≤ 10 µs; Figure 3	-	1.49	A
P_{tot}	total power dissipation	T_{sp} = 25 °C; Figure 1	-	0.41	W
T_{stg}	storage temperature		–55	+150	°C
T_j	junction temperature		–55	+150	°C
Source-drain diode					
I_S	source (diode forward) current (DC)	T_{sp} = 25 °C	-	0.34	A
I_{SM}	peak source (diode forward) current	T_{sp} = 25 °C; pulsed; t_p ≤ 10 µs	-	0.69	A

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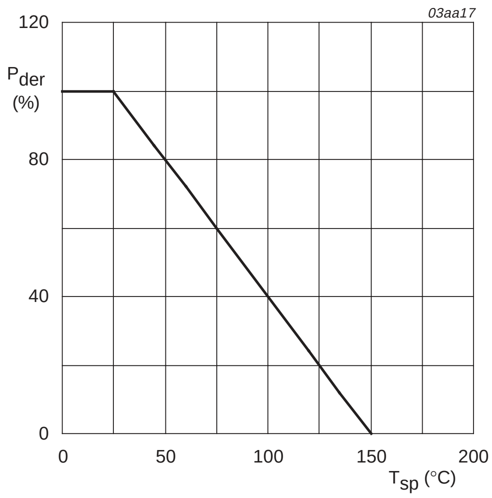
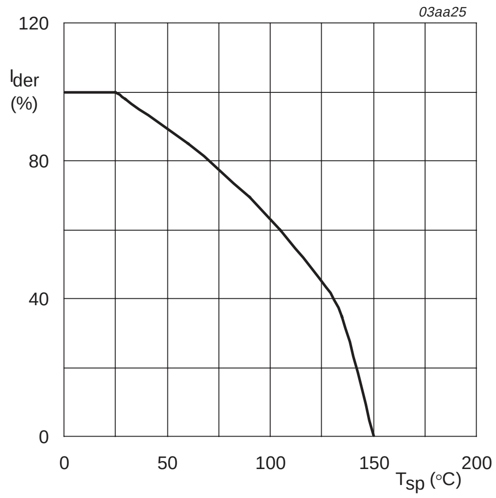


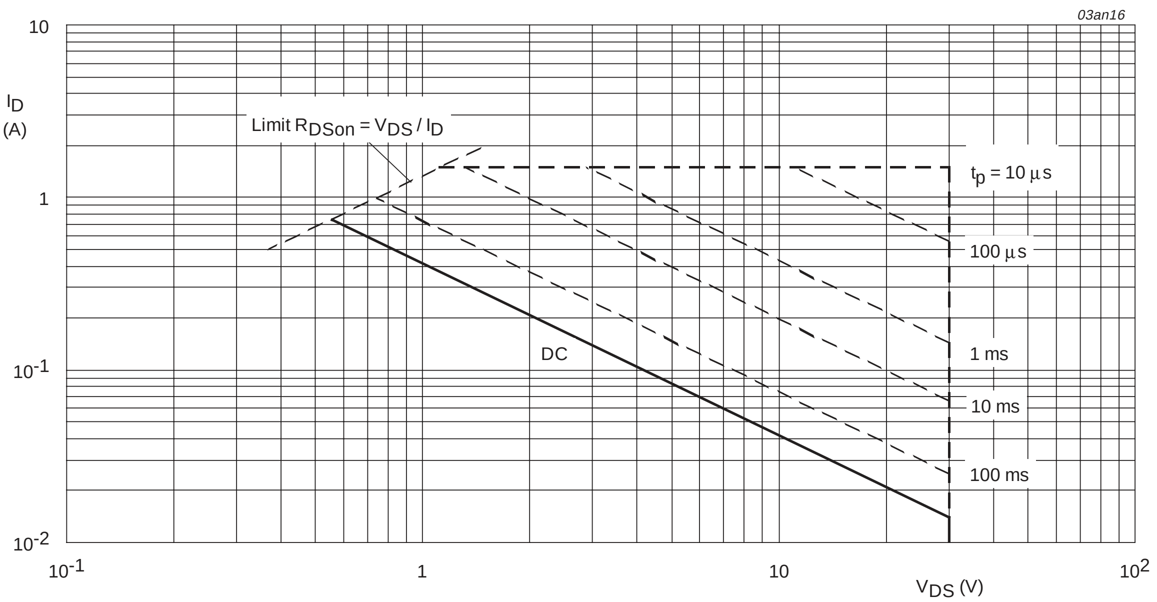
$$P_{der} = \frac{P_{tot}}{P_{tot(25^\circ C)}} \times 100\%$$

Fig 1. Normalized total power dissipation as a function of solder point temperature.



$$I_{der} = \frac{I_D}{I_{D(25^\circ C)}} \times 100\%$$

Fig 2. Normalized continuous drain current as a function of solder point temperature.



T_{sp} = 25 °C; I_{DM} is single pulse; V_{GS} = 4.5 V

Fig 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage.

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5. Thermal characteristics

Table 4: Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point	Figure 4	-	-	300	K/W

5.1 Transient thermal impedance

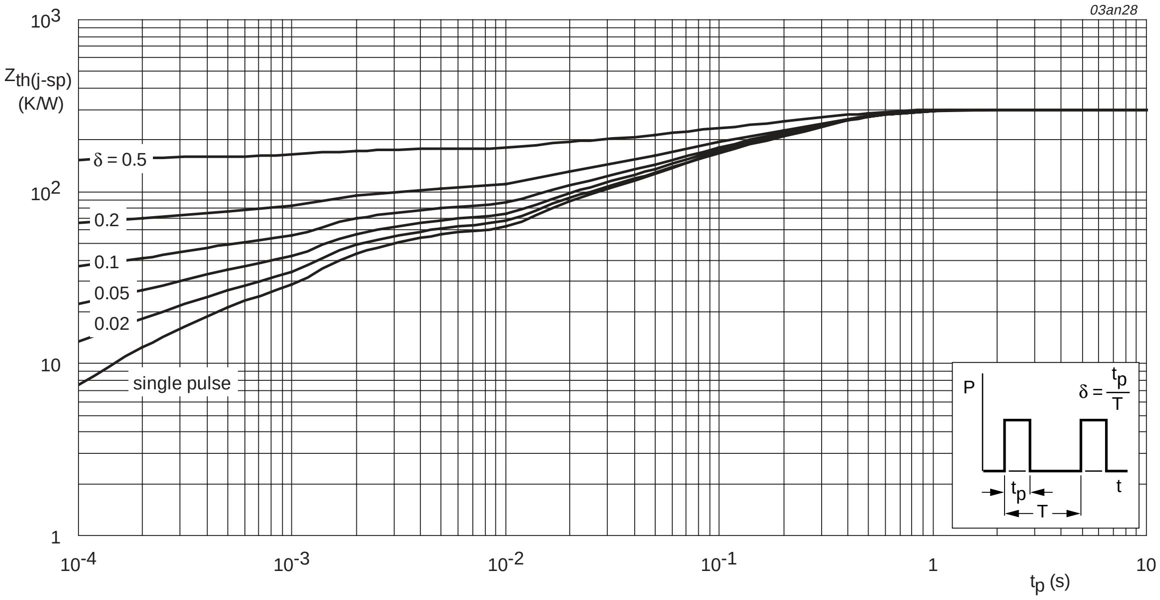

Fig 4. Transient thermal impedance from junction to solder point as a function of pulse duration.

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6. Characteristics

Table 5: Characteristics

T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	I_D = 1 µA; V_{GS} = 0 V				
		T_j = 25 °C	30	-	-	V
		T_j = –55 °C	27	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	I_D = 0.25 mA; V_{DS} = V_{GS}; Figure 9				
		T_j = 25 °C	0.5	1	1.5	V
		T_j = 150 °C	0.35	-	-	V
		T_j = –55 °C	-	-	1.8	V
I_{DSS}	drain-source leakage current	V_{DS} = 30 V; V_{GS} = 0 V				
		T_j = 25 °C	-	-	1	µA
		T_j = 150 °C	-	-	100	µA
I_{GSS}	gate-source leakage current	V_{GS} = ±12 V; V_{DS} = 0 V	-	10	100	nA
R_{DSon}	drain-source on-state resistance	V_{GS} = 4.5 V; I_D = 0.2 A; Figure 7 and 8				
		T_j = 25 °C	-	370	440	mΩ
		T_j = 150 °C	-	629	748	mΩ
		V_{GS} = 2.5 V; I_D = 0.1 A; Figure 7 and 8	-	550	650	mΩ
Dynamic characteristics						
$Q_{g(tot)}$	total gate charge	I_D = 1 A; V_{DD} = 15 V; V_{GS} = 4.5 V; Figure 13	-	0.65	-	nC
Q_{gs}	gate-source charge		-	0.14	-	nC
Q_{gd}	gate-drain (Miller) charge		-	0.18	-	nC
C_{iss}	input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz; Figure 11	-	37	-	pF
C_{oss}	output capacitance		-	8.5	-	pF
C_{rss}	reverse transfer capacitance		-	5.5	-	pF
$t_{d(on)}$	turn-on delay time	V_{DD} = 15 V; R_L = 15 Ω; V_{GS} = 4.5 V; R_G = 6 Ω	-	6.5	-	ns
t_r	rise time		-	9.5	-	ns
$t_{d(off)}$	turn-off delay time		-	14	-	ns
t_f	fall time		-	5.5	-	ns
Source-drain diode						
V_{SD}	source-drain (diode forward) voltage	I_S = 0.3 A; V_{GS} = 0 V; Figure 12	-	0.78	1.2	V

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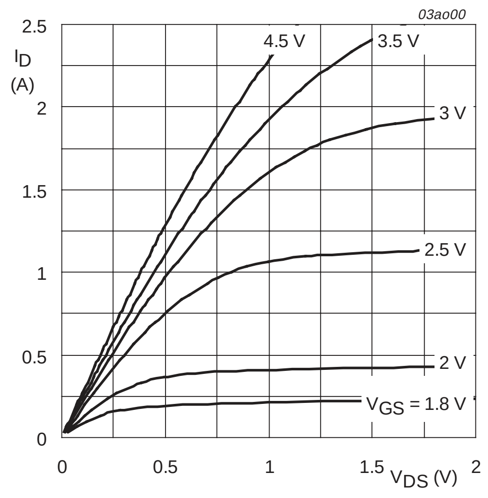
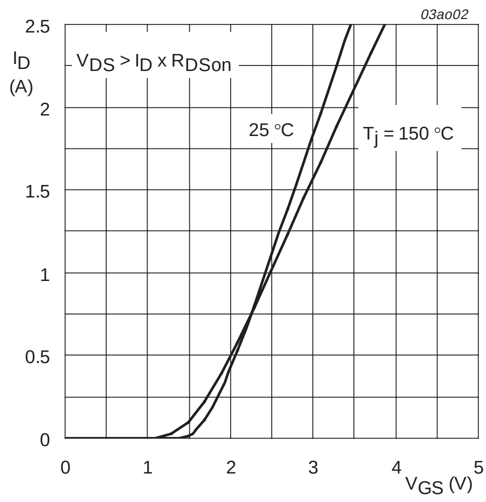


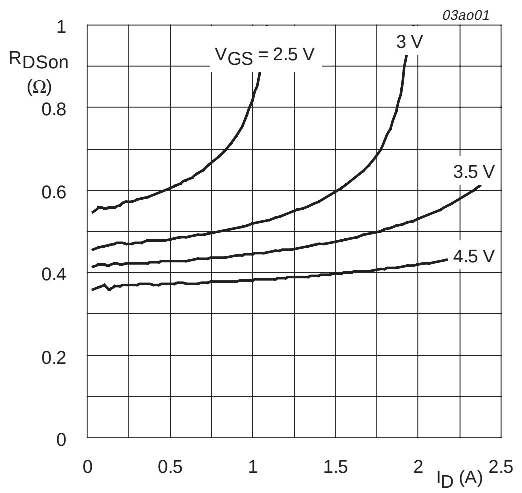
T_j = 25 °C

Fig 5. Output characteristics: drain current as a function of drain-source voltage; typical values.



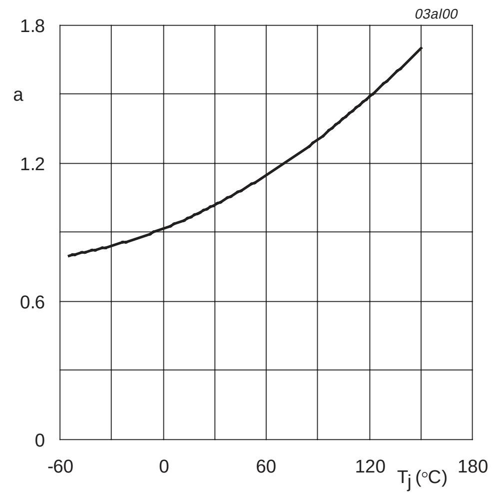
T_j = 25 °C and 150 °C; $V_{DS} > I_D \times R_{DSon}$

Fig 6. Transfer characteristics: drain current as a function of gate-source voltage; typical values.



T_j = 25 °C

Fig 7. Drain-source on-state resistance as a function of drain current; typical values.



$$a = \frac{R_{DSon}}{R_{DSon(25^{\circ}C)}}$$

Fig 8. Normalized drain-source on-state resistance factor as a function of junction temperature.

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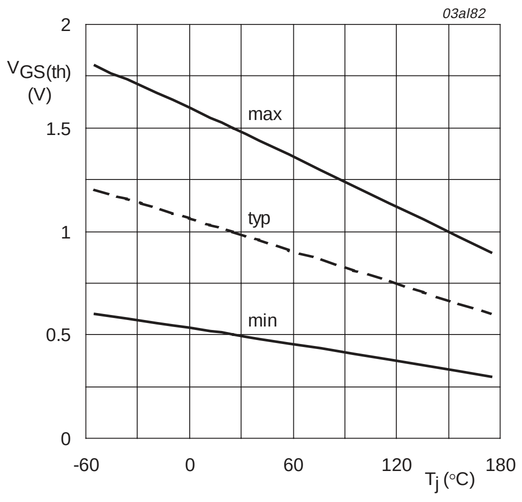
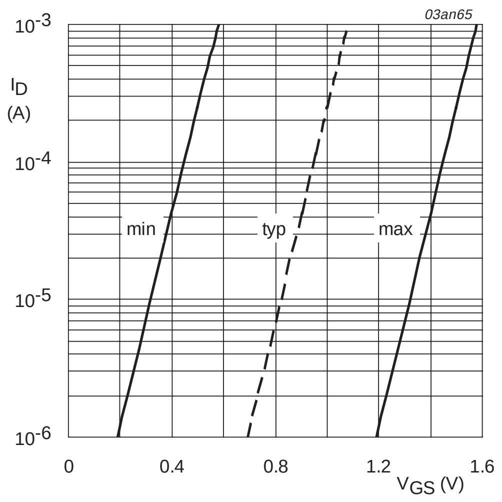


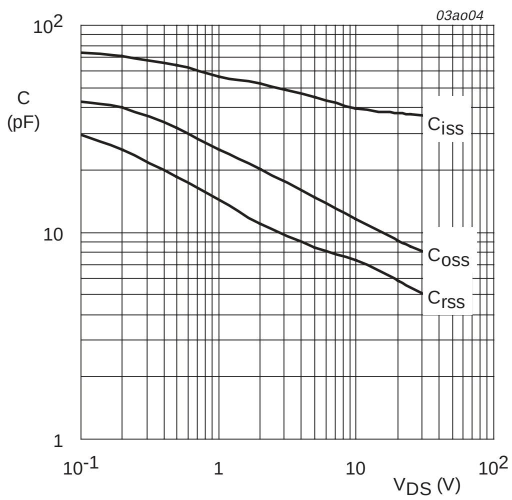
I_D = 0.25 mA; $V_{DS} = V_{GS}$

Fig 9. Gate-source threshold voltage as a function of junction temperature.



T_j = 25 °C; V_{DS} = 5 V

Fig 10. Sub-threshold drain current as a function of gate-source voltage.



V_{GS} = 0 V; f = 1 MHz

Fig 11. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values.

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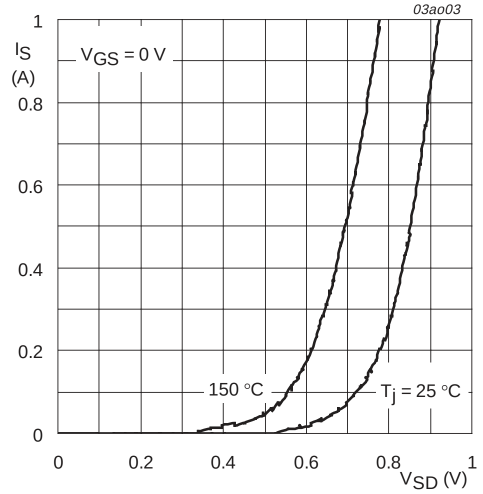
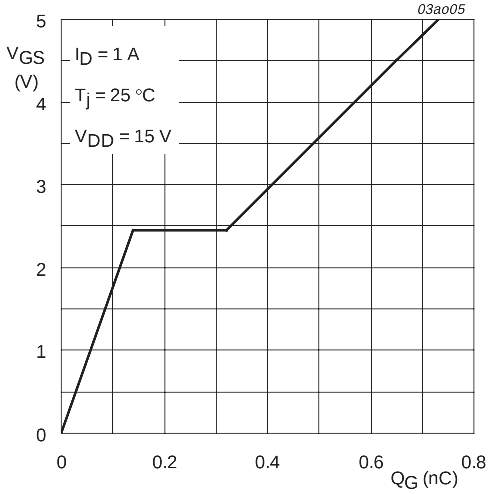


T_j = 25 °C and 150 °C; V_{GS} = 0 V

Fig 12. Source (diode forward) current as a function of source-drain (diode forward) voltage; typical values.



I_D = 1 A; V_{DD} = 15 V

Fig 13. Gate-source voltage as a function of gate charge; typical values.

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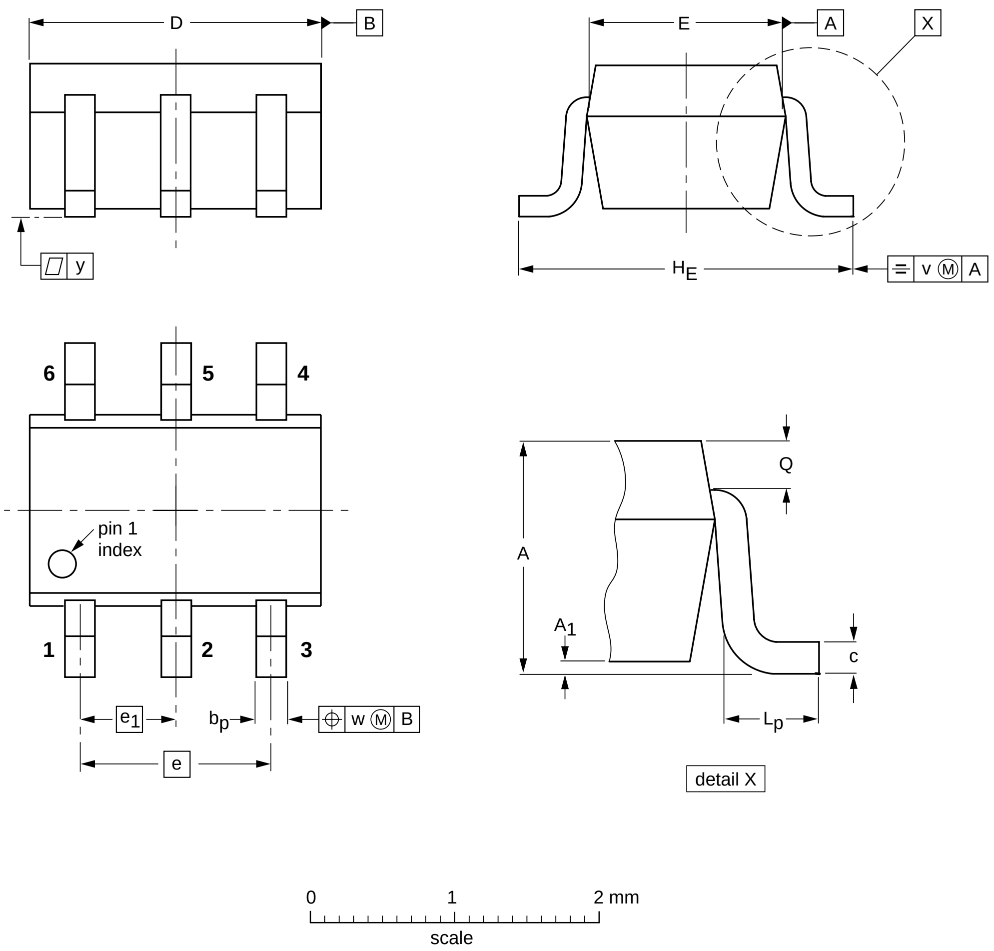
7. Package outline

Plastic surface mounted package; 6 leads **SOT363**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max	b_p	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.1 0.8	0.1	0.30 0.20	0.25 0.10	2.2 1.8	1.35 1.15	1.3	0.65	2.2 2.0	0.45 0.15	0.25 0.15	0.2	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT363			SC-88			97-02-28

Fig 14. SOT363 (SC-88).

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8. Revision history

Table 6: Revision history

Rev	Date	CPCN	Description
01	20040227	-	Product data (9397 750 12761).

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[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). 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 the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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