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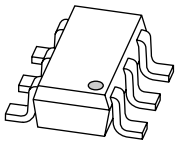


PMD9050D

MOSFET driver

Rev. 01 — 27 November 2006 **Product data sheet**

1. Product profile

1.1 General description

NPN transistor and high-speed switching diode supplemented by an NPN/PNP transistor pair connected as a silicon-controlled switch in a SOT457 (SC-74) small Surface-Mounted Device (SMD) plastic package.

1.2 Features

- General-purpose transistor and high-speed switching diode as driver
- Silicon-controlled switch to bypass the driver transistor
- Application-optimized pinout
- Internal connections to minimize layout effort
- Space-saving solution
- Reduces component count

1.3 Applications

- MOSFET driver with silicon-controlled switch

1.4 Quick reference data

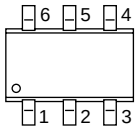
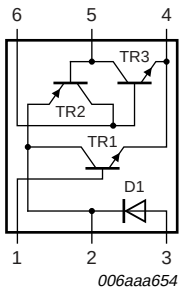
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor; for the PNP transistor with negative polarity							
V_{CEO}	collector-emitter voltage	open base		-	-	45	V
I_C	collector current			-	-	0.1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	-	0.2	A
Diode (D1)							
I_F	forward current			-	-	0.2	A
V_F	forward voltage	I_F = 200 mA	[1]	-	-	1.1	V
V_R	reverse voltage			-	-	60	V

[1] Pulse test: $t_p \leq 300$ µs; $\delta \leq 0.02$.

2. Pinning information

Table 2. Pinning

Pin	Symbol	Description	Simplified outline	Symbol
1	IN	input		
2	OUT	output		
3	RC	collector resistor		
4	GND	ground		
5	ON	output enable		
6	OFF	output disable		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMD9050D	SC-74	plastic surface-mounted package (TSOP6); 6 leads	SOT457

4. Marking

Table 4. Marking codes

Type number	Marking code
PMD9050D	9G

5. Limiting values

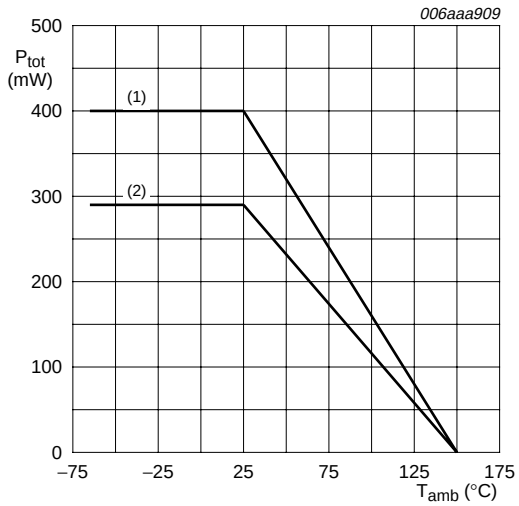
Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
Per transistor; for the PNP transistor with negative polarity						
V_{CBO}	collector-base voltage	open emitter		-	50	V
V_{CEO}	collector-emitter voltage	open base		-	45	V
V_{EBO}	emitter-base voltage	open collector		-	5	V
I_C	collector current			-	0.1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	0.2	A
I_B	base current			-	0.1	A
I_{BM}	peak base current	single pulse; $t_p \leq 1$ ms		-	0.2	A
Diode (D1)						
V_{RRM}	repetitive peak reverse voltage			-	60	V
V_R	reverse voltage			-	60	V
I_F	forward current			-	0.2	A
I_{FRM}	repetitive peak forward current	$t_p \leq 1$ ms; $\delta = 0.25$		-	0.6	A
I_{FSM}	non-repetitive peak forward current	square wave				
		$t_p \leq 1$ µs		-	9	A
		$t_p \leq 100$ µs		-	3	A
		$t_p \leq 10$ ms		-	1.7	A
Device						
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	290	mW
			[2]	-	400	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			–65	+150	°C
T_{stg}	storage temperature			–65	+150	°C

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[2] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.



(1) Ceramic PCB, Al_2O_3, standard footprint

(2) FR4 PCB, standard footprint

Fig 1. Power derating curves

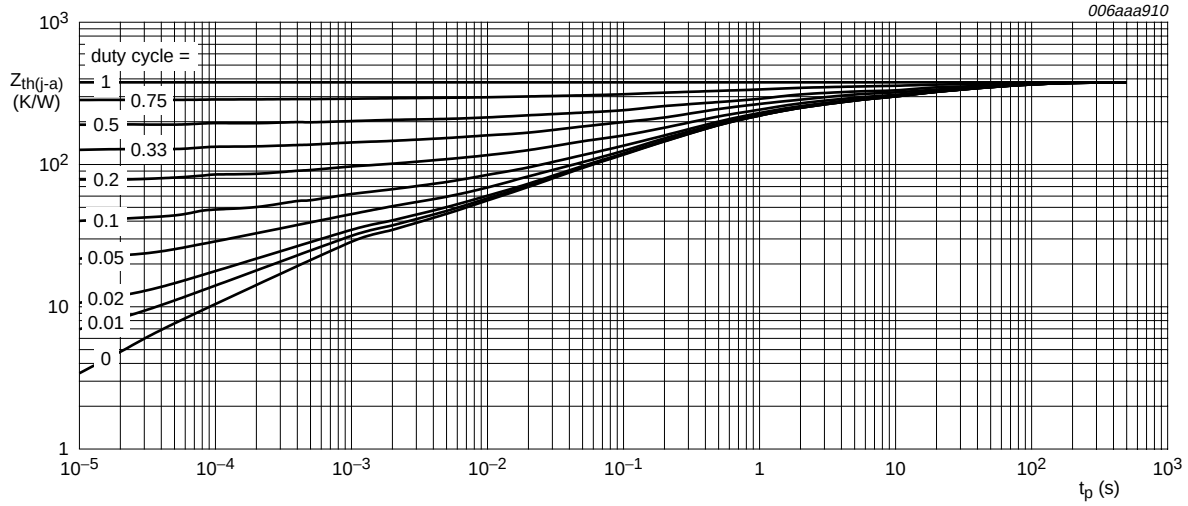
6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Device							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	430	K/W
			[2]	-	-	312	K/W

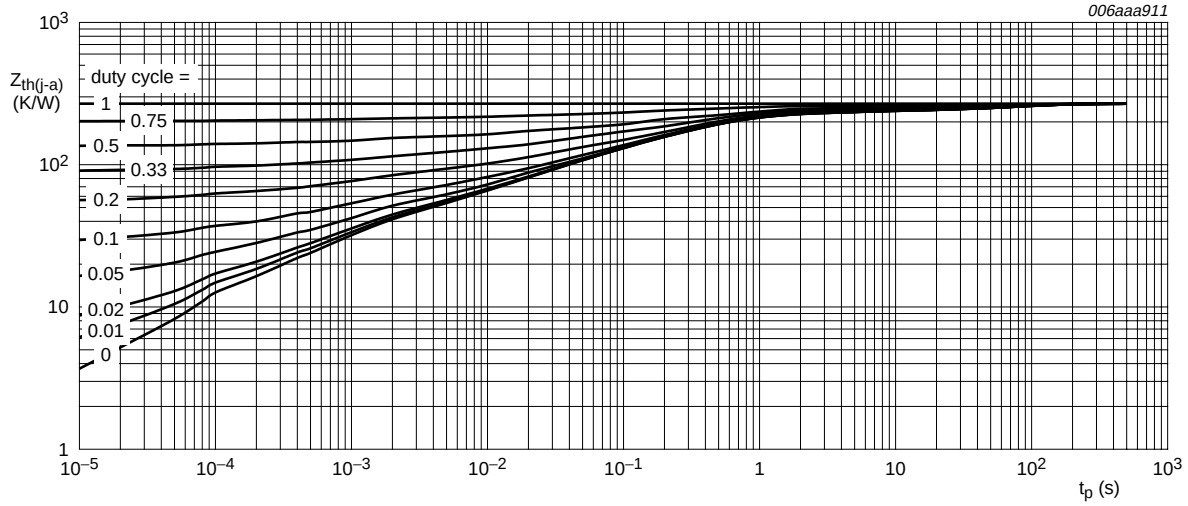
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[2] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.



FR4 PCB, standard footprint

Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



Ceramic PCB, Al_2O_3, standard footprint

Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

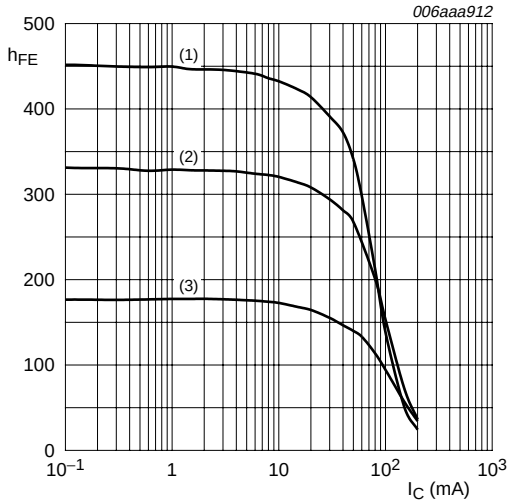
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor; for the PNP transistor with negative polarity							
I_{CBO}	collector-base cut-off current	V_{CB} = 30 V; I_E = 0 A		-	-	50	nA
		V_{CB} = 30 V; I_E = 0 A; T_j = 150 °C		-	-	10	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_C = 0 A		-	-	100	nA
h_{FE}	DC current gain						
	TR1 and TR3 (NPN)	V_{CE} = 5 V; I_C = 1 mA		200	320	450	
		V_{CE} = 5 V; I_C = 100 mA		95	165	-	
		V_{CE} = 5 V; I_C = 200 mA		24	40	-	
	TR2 (PNP)	V_{CE} = 5 V; I_C = 1 mA		200	270	450	
		V_{CE} = 5 V; I_C = 100 mA		95	120	-	
		V_{CE} = 5 V; I_C = 200 mA		24	45	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 10 mA; I_B = 0.5 mA		-	70	200	mV
		I_C = 100 mA; I_B = 5 mA		-	200	400	mV
		I_C = 200 mA; I_B = 20 mA		-	350	500	mV
V_{BEsat}	base-emitter saturation voltage	I_C = 10 mA; I_B = 0.5 mA		-	0.74	-	V
		I_C = 100 mA; I_B = 5 mA		-	0.91	-	V
		I_C = 200 mA; I_B = 20 mA		-	1	1.2	V
V_{BE}	base-emitter voltage	V_{CE} = 5 V; I_C = 2 mA		-	660	-	mV
Diode (D1)							
V_F	forward voltage	I_F = 200 mA	[1]	-	-	1.1	V
I_R	reverse current	V_R = 60 V		-	-	100	nA
		V_R = 60 V; T_j = 150 °C		-	-	100	µA
t_{rr}	reverse recovery time		[2]	-	-	6	ns
V_{FR}	forward recovery voltage		[3]	-	-	2	V
Transistor 1 (TR1)							
t_d	delay time	I_C = 0.05 A; I_{Bon} = 2.5 mA; I_{Boff} = −2.5 mA		-	12	-	ns
t_r	rise time			-	78	-	ns
t_{on}	turn-on time			-	90	-	ns
t_s	storage time			-	853	-	ns
t_f	fall time			-	205	-	ns
t_{off}	turn-off time			-	1058	-	ns

[1] Pulse test: $t_p \leq 300$ µs; $\delta \leq 0.02$.

[2] When switched from I_F = 400 mA to I_R = 400 mA; R_L = 100 Ω; measured at I_R = 40 mA.

[3] When switched from I_F = 400 mA; t_r = 30 ns.



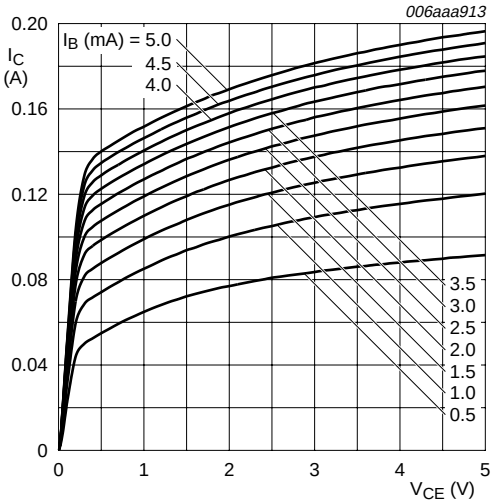
V_{CE} = 5 V

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

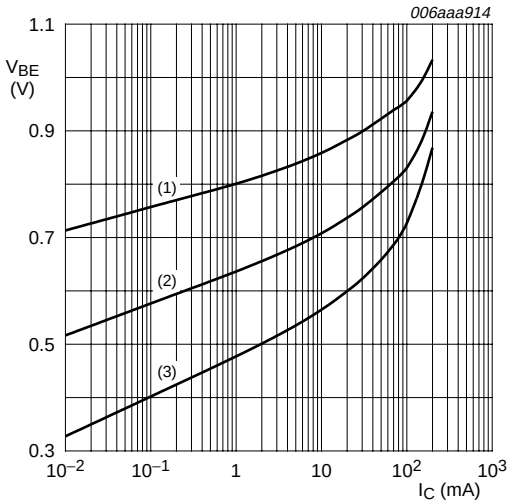
(3) T_{amb} = –55 °C

Fig 4. TR1 (NPN): DC current gain as a function of collector current; typical values



T_{amb} = 25 °C

Fig 5. TR1 (NPN): Collector current as a function of collector-emitter voltage; typical values



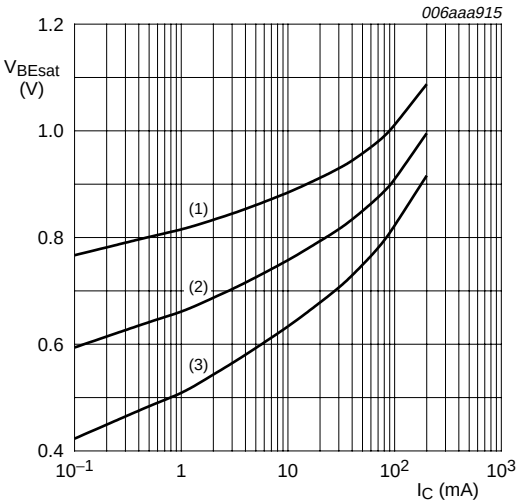
V_{CE} = 5 V

(1) T_{amb} = –55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 100 °C

Fig 6. TR1 (NPN): Base-emitter voltage as a function of collector current; typical values



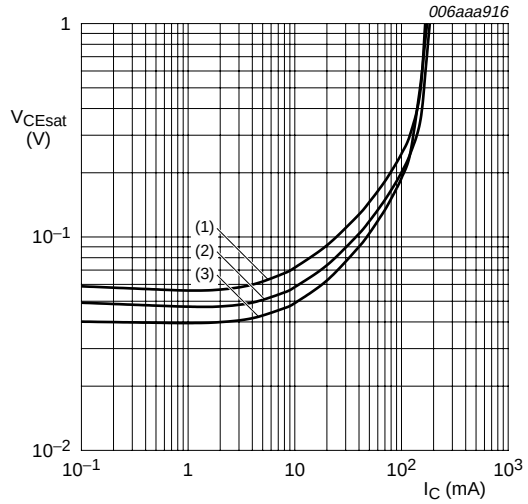
I_C/I_B = 20

(1) T_{amb} = –55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 100 °C

Fig 7. TR1 (NPN): Base-emitter saturation voltage as a function of collector current; typical values



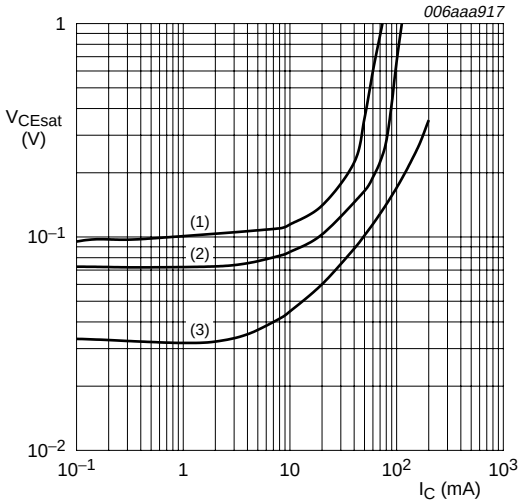
I_C/I_B = 20

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = –55 °C

Fig 8. TR1 (NPN): Collector-emitter saturation voltage as a function of collector current; typical values



T_{amb} = 25 °C

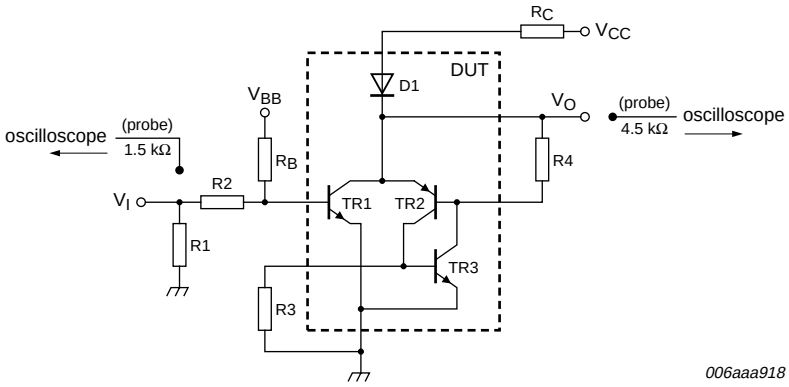
(1) I_C/I_B = 100

(2) I_C/I_B = 50

(3) I_C/I_B = 10

Fig 9. TR1 (NPN): Collector-emitter saturation voltage as a function of collector current; typical values

8. Test information



I_C = 0.05 A; I_{Bon} = 2.5 mA; I_{Boff} = –2.5 mA; R1 = 50 Ω; R2 = 1 kΩ; R3 = 1 kΩ; R4 = 1 kΩ; R_B = 1.5 kΩ; R_C = 150 Ω

Fig 10. Test circuit for switching times per TR1

9. Package outline

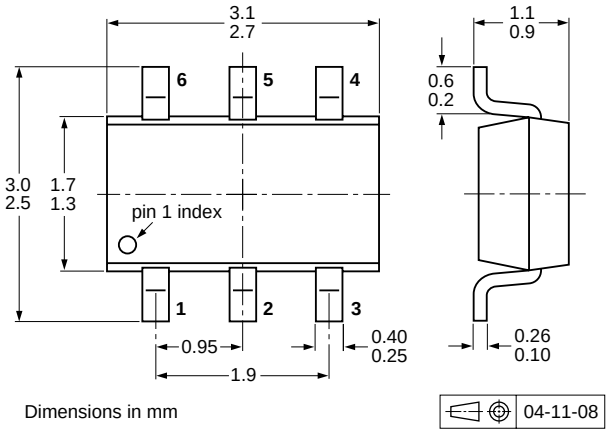


Fig 11. Package outline SOT457 (SC-74)

10. Packing information

Table 8. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.[1]

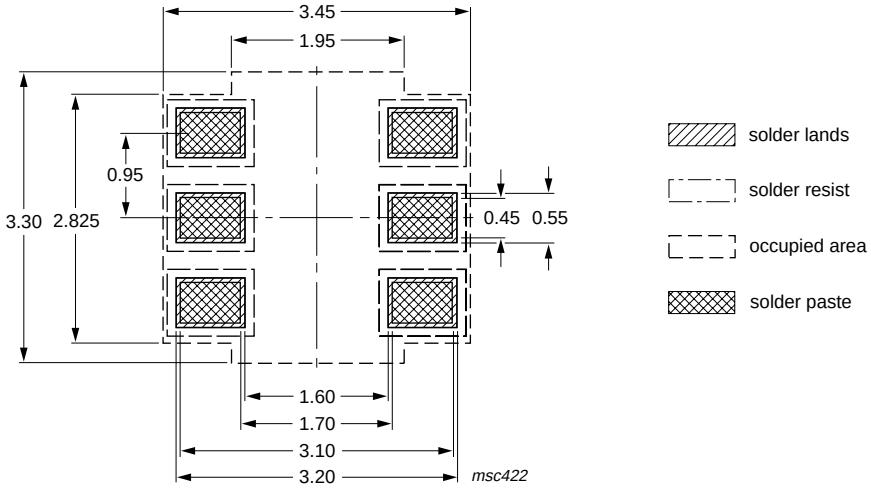
Type number	Package	Description		Packing quantity	
				3000	10000
PMD9050D	SOT457	4 mm pitch, 8 mm tape and reel; T1	[2]	-115	-135
		4 mm pitch, 8 mm tape and reel; T2	[3]	-125	-165

[1] For further information and the availability of packing methods, see Section 14.

[2] T1: normal taping

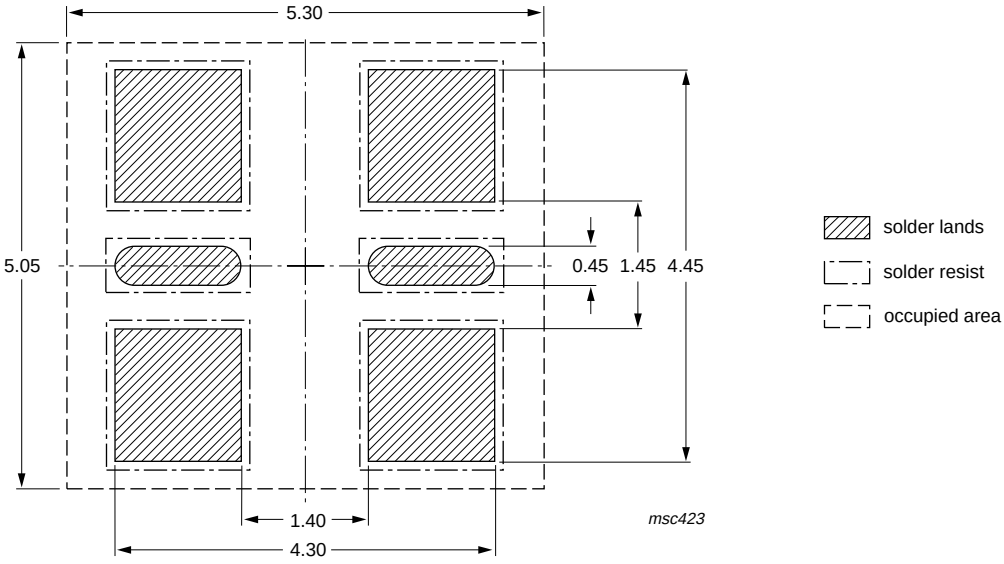
[3] T2: reverse taping

11. Soldering



Dimensions in mm

Fig 12. Reflow soldering footprint



Dimensions in mm

Fig 13. Wave soldering footprint

12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMD9050D_1	20061127	Product data sheet	-	-

13. Legal information

13.1 Data sheet status

Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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[2] The term 'short data sheet' is explained in section "Definitions".

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15. Contents

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