

High-Speed N-Channel Power MOSFET

Features:

- Low Drain-to-Source On Resistance ($R_{DS(ON)}$)
- Low Total Gate Charge (Q_G) and Gate-to-Drain Charge (Q_{GD})
- Low Series Gate Resistance (R_G)
- Fast Switching
- Capable of Short Dead-Time Operation
- RoHS Compliant

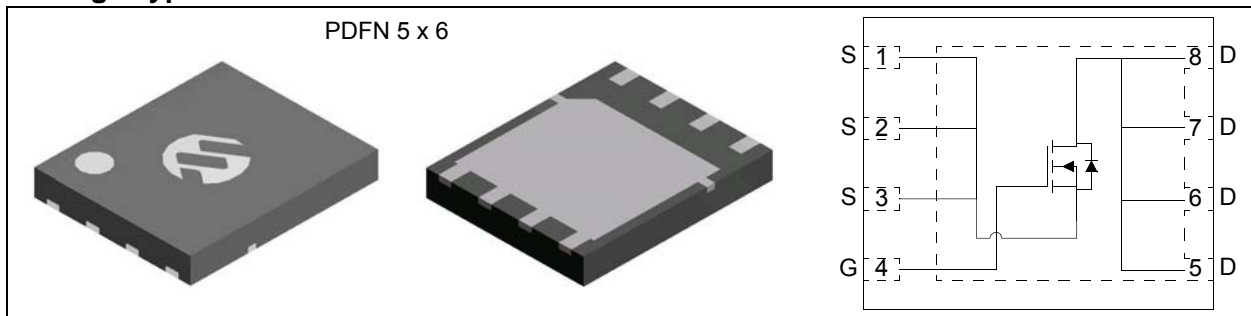
Description:

The MCP87030 is an N-Channel power MOSFET in a popular PDFN 5 mm x 6 mm package. Advanced packaging and silicon processing technologies allow the MCP87030 to achieve a low Q_G for a given $R_{DS(on)}$ value, resulting in a low Figure of Merit (FOM). Combined with low R_G , the low FOM of the MCP87030 allows high efficiency power conversion with reduced switching and conduction losses.

Applications:

- Point-of-Load DC-DC Converters
- High Efficiency Power Management in Servers, Networking and Automotive Applications

Package Type



Product Summary Table: Unless otherwise indicated, $T_A = +25^\circ\text{C}$

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Operating Characteristics						
Drain-to-Source Breakdown Voltage	BV_{DSS}	25	—	—	V	$V_{GS} = 0V, I_D = 250 \mu A$
Gate-to-Source Threshold Voltage	$V_{GS(TH)}$	1	1.3	1.6	V	$V_{DS} = V_{GS}, I_D = 250 \mu A$
Drain-to-Source On Resistance	$R_{DS(ON)}$	—	3.3	4	m Ω	$V_{GS} = 4.5V, I_D = 20A$
		—	2.8	3.5	m Ω	$V_{GS} = 10V, I_D = 20A$
Total Gate Charge	Q_G	—	17	22	nC	$V_{DS} = 12.5V, I_D = 20A, V_{GS} = 4.5V$
Gate-to-Drain Charge	Q_{GD}	—	6.7	—	nC	$V_{DS} = 12.5V, I_D = 20A$
Series Gate Resistance	R_G	—	1.2	—	Ω	—
Thermal Characteristics						
Thermal Resistance Junction-to-X	$R_{\theta JX}$	—	—	56	$^\circ\text{C/W}$	Note 1
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	—	—	1.8	$^\circ\text{C/W}$	Note 2

Note 1: $R_{\theta JX}$ is determined with the device surface mounted on a 4-Layer FR4 PCB, with a 1" x 1" mounting pad of 2 oz. copper. This characteristic is dependent on user's board design.

2: $R_{\theta JC}$ is determined using JEDEC 51-14 Method. This characteristic is determined by design.

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1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings†

V_{DS}	+25V
V_{GS}	+10.0V / -8V
I_D , Continuous	100A, $T_C = +25^\circ\text{C}$
P_D	2.2W, $T_A = +25^\circ\text{C}$
T_J , T_{STG}	-55°C to +150°C
E_{AS} Avalanche Energy	450 mJ
$I_D = 30\text{A}$, $L = 1\text{ mH}$, $R_G = 25\Omega$	

† **Notice:** Stresses above those listed under “Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.

DC ELECTRICAL CHARACTERISTICS

Electrical Characteristics: Unless otherwise indicated, $T_A = +25^\circ\text{C}$						
Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Static Characteristics						
Drain-to-Source Breakdown Voltage	B_{VDSS}	25	—	—	V	$V_{GS} = 0\text{V}$, $I_D = 250\ \mu\text{A}$
Drain-to-Source Leakage Current	I_{DSS}	—	—	1	μA	$V_{GS} = 0\text{V}$, $V_{DS} = 20\text{V}$
Gate-to-Source Leakage Current	I_{GSS}	—	—	100	nA	$V_{DS} = 0\text{V}$, $V_{GS} = 10\text{V}/-8\text{V}$
Gate-to-Source Threshold Voltage	$V_{GS(TH)}$	1	1.3	1.6	V	$V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{A}$
Drain-to-Source On Resistance	$R_{DS(ON)}$	—	4	—	$\text{m}\Omega$	$V_{GS} = 3.3\text{V}$, $I_D = 20\text{A}$
		—	3.3	4	$\text{m}\Omega$	$V_{GS} = 4.5\text{V}$, $I_D = 20\text{A}$
		—	2.8	3.5	$\text{m}\Omega$	$V_{GS} = 10\text{V}$, $I_D = 20\text{A}$
Transconductance	g_{fs}	—	113	—	S	$V_{DS} = 12.5\text{V}$, $I_D = 20\text{A}$
Dynamic Characteristics						
Input Capacitance	C_{ISS}	—	1635	—	pF	$V_{GS} = 0\text{V}$, $V_{DS} = 12.5\text{V}$, $f = 1\text{ MHz}$
Output Capacitance	C_{OSS}	—	730	—	pF	$V_{GS} = 0\text{V}$, $V_{DS} = 12.5\text{V}$, $f = 1\text{ MHz}$
Reverse Transfer Capacitance	C_{RSS}	—	160	—	pF	$V_{GS} = 0\text{V}$, $V_{DS} = 12.5\text{V}$, $f = 1\text{ MHz}$
Total Gate Charge	Q_G	—	17	22	nC	$V_{DS} = 12.5\text{V}$, $I_D = 20\text{A}$, $V_{GS} = 4.5\text{V}$
Gate-to-Drain Charge	Q_{GD}	—	6.7	—	nC	$V_{DS} = 12.5\text{V}$, $I_D = 20\text{A}$
Gate-to-Source Charge	Q_{GS}	—	3.2	—	nC	$V_{DS} = 12.5\text{V}$, $I_D = 20\text{A}$
Gate Charge at $V_{GS(TH)}$	$Q_{G(TH)}$	—	2.1	—	nC	$V_{DS} = 12.5\text{V}$, $I_D = 20\text{A}$
Output Charge	Q_{OSS}	—	14.3	—	nC	$V_{DS} = 12.5\text{V}$, $V_{GS} = 0$
Turn-On Delay Time	$t_{d(on)}$	—	5	—	ns	$V_{DS} = 12.5\text{V}$, $V_{GS} = 4.5\text{V}$, $I_D = 20\text{A}$, $R_G = 2\Omega$
Rise Time	t_r	—	17	—	ns	$V_{DS} = 12.5\text{V}$, $V_{GS} = 4.5\text{V}$, $I_D = 20\text{A}$, $R_G = 2\Omega$
Turn-Off Delay Time	$t_{d(off)}$	—	14	—	ns	$V_{DS} = 12.5\text{V}$, $V_{GS} = 4.5\text{V}$, $I_D = 20\text{A}$, $R_G = 2\Omega$
Fall Time	t_f	—	16	—	ns	$V_{DS} = 12.5\text{V}$, $V_{GS} = 4.5\text{V}$, $I_D = 20\text{A}$, $R_G = 2\Omega$
Series Gate Resistance	R_G	—	1.2	—	Ω	

DC ELECTRICAL CHARACTERISTICS (CONTINUED)

Electrical Characteristics: Unless otherwise indicated, $T_A = +25^\circ\text{C}$						
Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Diode Characteristics						
Diode Forward Voltage	V_{FD}	—	0.8	1	V	$I_S = 20\text{A}$, $V_{GS} = 0\text{V}$
Reverse Recovery Charge	Q_{RR}	—	32	—	nC	$I_S = 20\text{A}$, $di/dt = 300\text{ A}/\mu\text{s}$
Reverse Recovery Time	t_{rr}	—	20	—	ns	$I_S = 20\text{A}$, $di/dt = 300\text{ A}/\mu\text{s}$
Avalanche Characteristics						
Avalanche Energy	E_{AS}	112.5	—	—	mJ	$I_D = 15\text{A}$, $L = 1\text{ mH}$, $R_G = 25\Omega$

TEMPERATURE CHARACTERISTICS

Electrical Characteristics: Unless otherwise indicated, $T_A = +25^\circ\text{C}$							
Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions	
Temperature Ranges							
Operating Junction Temperature Range	T_J	-55	—	150	$^\circ\text{C}$		
Storage Temperature Range	T_A	-55	—	150	$^\circ\text{C}$		
Package Thermal Resistances							
Thermal Resistance Junction-to-X, 8L 5x6-PDFN	$R_{\theta JX}$	—	—	56	$^\circ\text{C}/\text{W}$	Note 1	
Thermal Resistance Junction-to-Case, 8L 5x6-PDFN	$R_{\theta JC}$	—	—	1.8	$^\circ\text{C}/\text{W}$	Note 2	

Note 1: $R_{\theta JX}$ is determined with the device surface mounted on a 4-Layer FR4 PCB, with a 1" x 1" mounting pad of 2 oz. copper. This characteristic is dependent on user's board design.

2: $R_{\theta JC}$ is determined using JEDEC 51-14 Method. This characteristic is determined by design.

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2.0 TYPICAL PERFORMANCE CURVES

Note: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.

Note: Unless otherwise indicated, $T_A = +25^\circ\text{C}$.

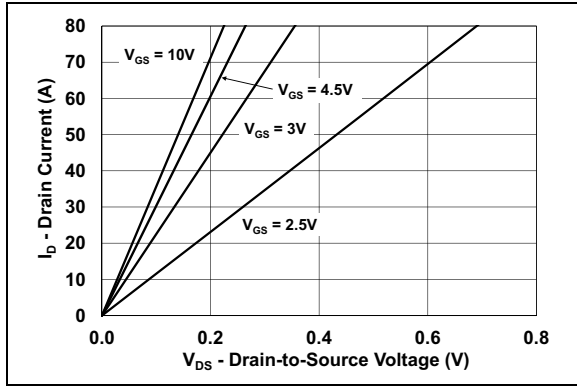


FIGURE 2-1: Typical Output Characteristics.

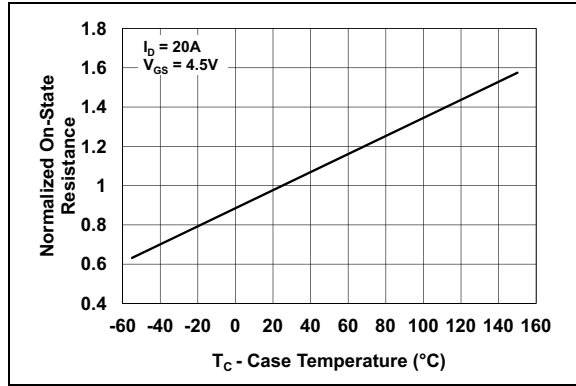


FIGURE 2-4: Normalized On Resistance vs. Temperature.

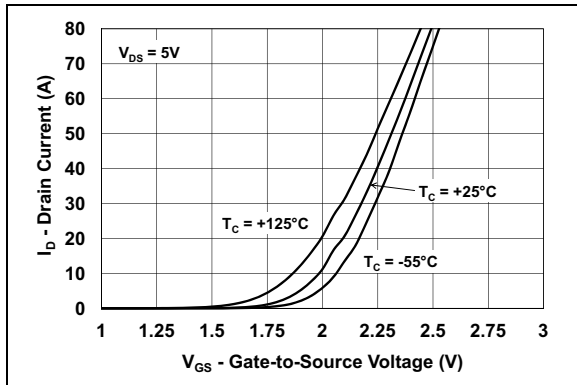


FIGURE 2-2: Typical Transfer Characteristics.

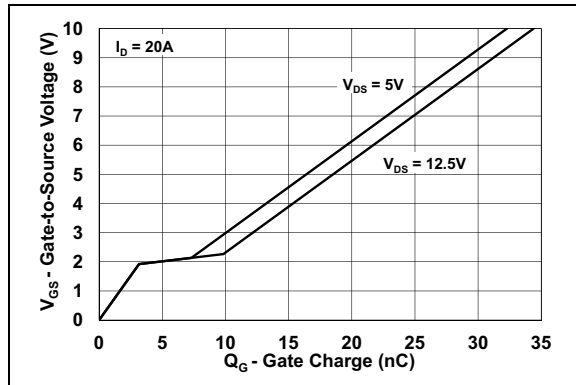


FIGURE 2-5: Gate-to-Source Voltage vs. Gate Charge.

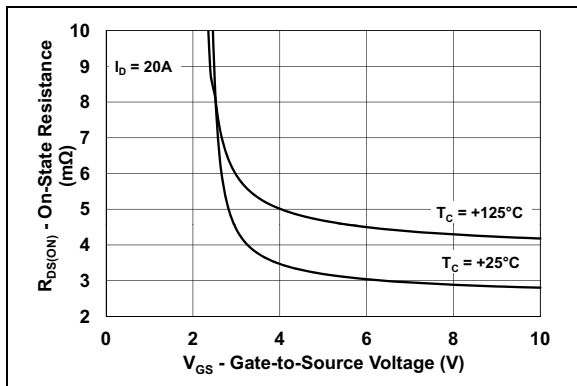


FIGURE 2-3: On Resistance vs. Gate-to-Source Voltage.

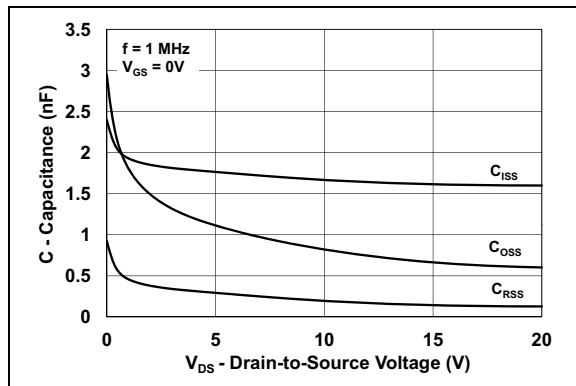


FIGURE 2-6: Capacitance vs. Drain-to-Source Voltage.

Note: Unless otherwise indicated, $T_A = +25^\circ\text{C}$.

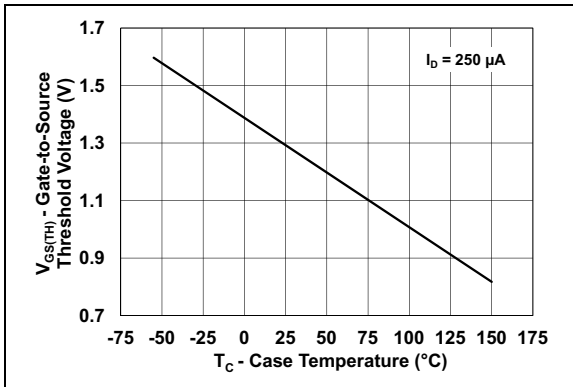


FIGURE 2-7: Gate-to-Source Threshold Voltage vs. Temperature.

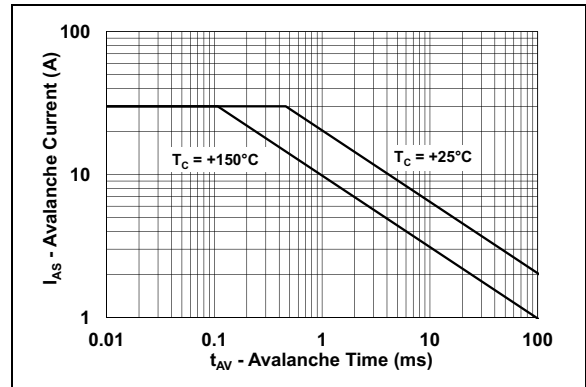


FIGURE 2-10: Single-Pulse Unclamped Inductive Switching.

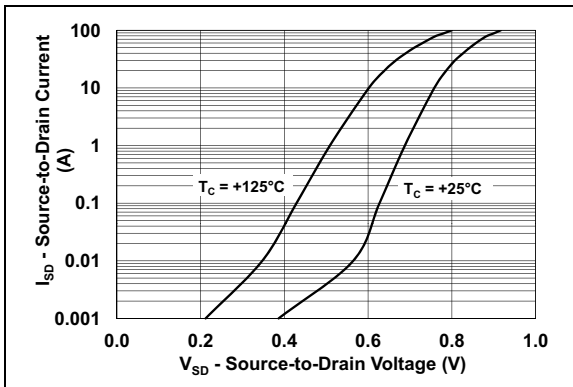


FIGURE 2-8: Source-to-Drain Current vs. Source-to-Drain Voltage.

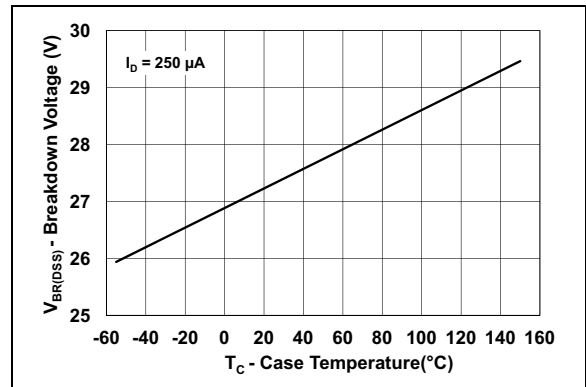


FIGURE 2-11: Drain-to-Source Breakdown Voltage vs. Temperature.

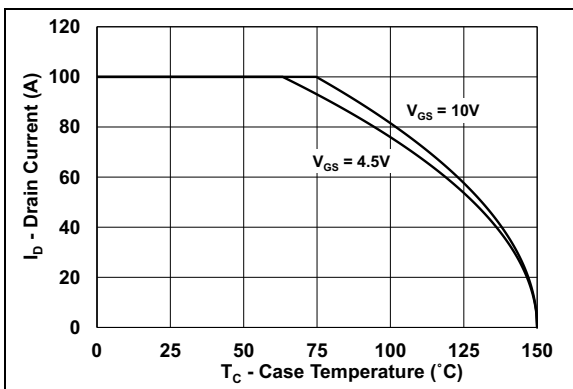


FIGURE 2-9: Maximum Drain Current vs. Temperature.

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3.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in [Table 3-1](#).

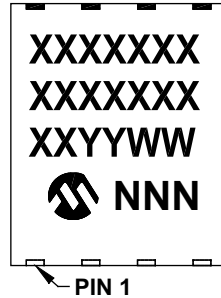
TABLE 3-1: PIN FUNCTION TABLE

MCP87030 5x6 PDFN	Symbol	Description
1, 2, 3	S	Source pin
4	G	Gate pin
5, 6, 7, 8	D	Drain pin, including exposed thermal pad

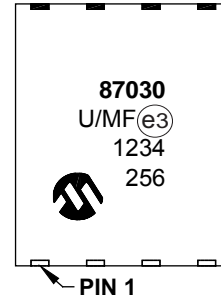
4.0 PACKAGING INFORMATION

4.1 Package Marking Information*

8-Lead PDFN (5x6x1.0 mm)



Example



*RoHS compliant using EU-RoHS exemption: 7(a) – Lead in high-melting-temperature-type solders (i.e., lead-based alloys containing 85% by weight or more lead) can be found on the outer packaging for this package.

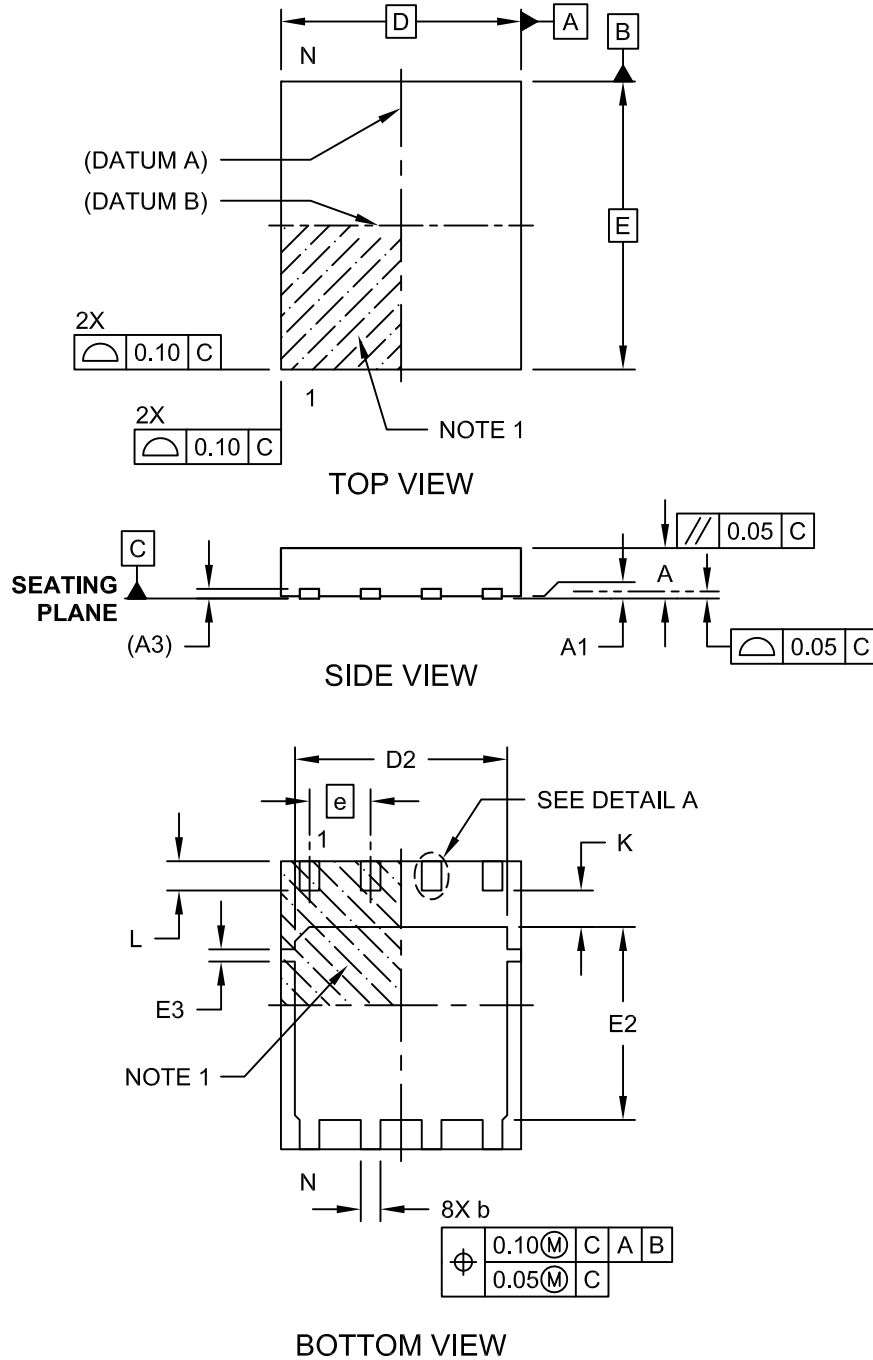
Legend:	XX...X	Customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week '01')
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator (e3) can be found on the outer packaging for this package.

Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information.

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8-Lead Power Dual Flatpack No Lead Package (MF) – 5x6x1.0 mm Body [PDFN]

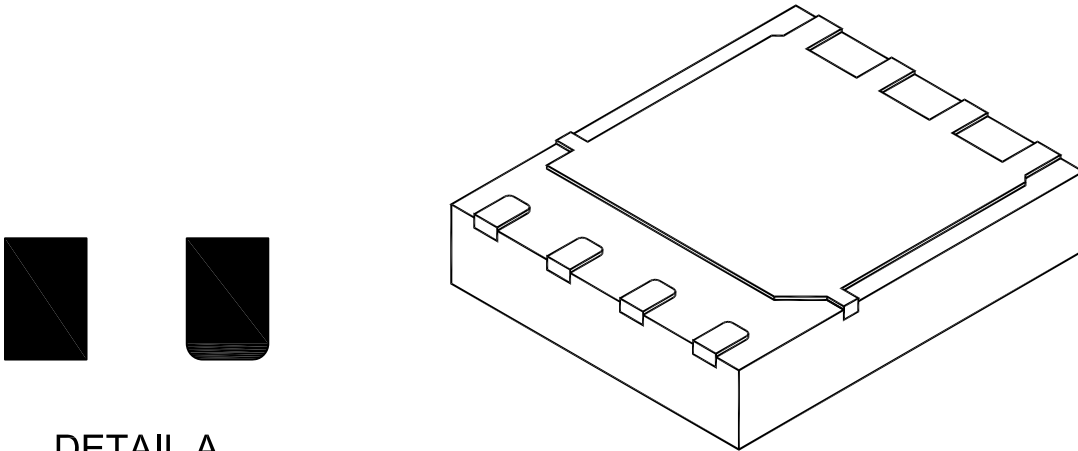
Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Microchip Technology Drawing C04-188B Sheet 1 of 2

8-Lead Power Dual Flatpack No Lead Package (MF) – 5x6x1.0 mm Body [PDFN]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



DETAIL A

ALTERNATE
CONTACT
SHAPES

Dimension	Units	MILLIMETERS		
	Limits	MIN	NOM	MAX
Number of Pins	N	8		
Pitch	e	1.27 BSC		
Overall Height	A	0.80	1.00	1.03
Standoff	A1	0.00	-	0.05
Terminal Thickness	(A3)	0.20 REF		
Overall Length	D	5.00 BSC		
Overall Width	E	6.00 BSC		
Exposed Pad length	D2	4.27	4.42	4.52
Exposed Pad Width	E2	3.87	4.02	4.12
Tab Width	E3	0.20	0.25	0.30
Terminal Width	b	0.36	0.41	0.46
Terminal Length	L	0.51	0.61	0.71
Terminal to Exposed Pad	K	0.71	0.76	0.81

Notes:

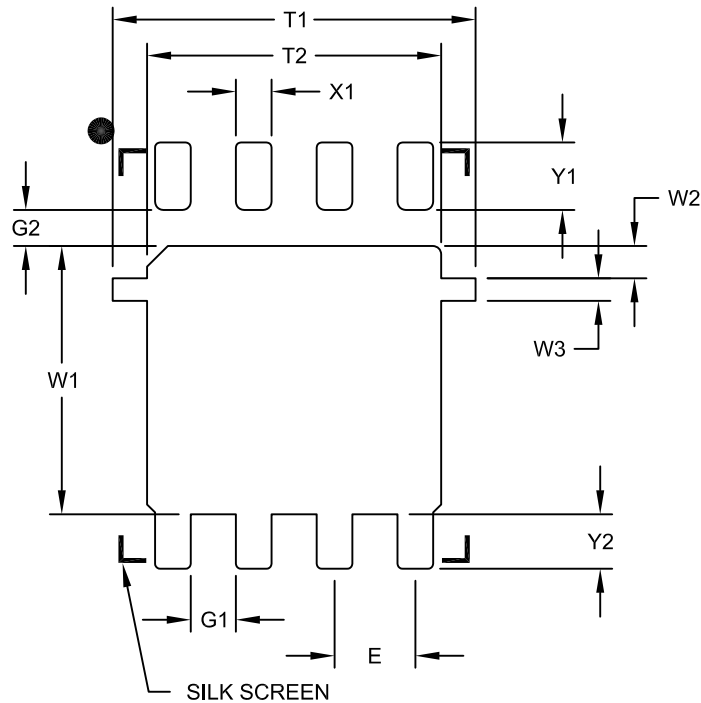
- Pin 1 visual index feature may vary, but must be located within the hatched area.
- Package is saw singulated.
- Package dimension does not include mold flash, protrusions, burrs or metal smearing.
- Dimensioning and tolerancing per ASME Y14.5M.
 - BSC: Basic Dimension. Theoretically exact value shown without tolerances.
 - REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-188B Sheet 2 of 2

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8-Lead Power Dual Flatpack No Lead Package (MF) – 5x6x1.0 mm Body [PDFN]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Contact Pitch	E	1.27 BSC		
Center Pad Width	W1			4.22
Pad Edge to Tab	W2		0.51	
Tab Width	W3		0.35	
Center Pad Length With Tabs	T1			5.70
Center Pad Length	T2			4.62
Distance Between Terminals	G1	0.71		
Terminal To Center Pad (X4)	G2	0.57		
Terminal Pad Width (X8)	X1			0.56
Terminal Pad Length (X4)	Y1			1.06
Terminal Pad Length (X8)	Y2			0.86

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2188A

APPENDIX A: REVISION HISTORY

Revision A (January 2013)

- Original Release of this Document.

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the factory or the listed sales office.

PART NO.	X	X	/XX
Device	Tape and Reel Option	Temperature Range	Package
Device:	MCP87030T:	N-Channel Power MOSFET (Tape and Reel)	
Temperature Range:	U = -55°C to +150°C (Ultra High)		
Package:	MF = 8-Lead High Power Dual Flatpack, No Lead Package (5x6x1.0 mm Body) (PDFN), 8-lead		

Examples:
a) MCP87030T-U/MF: Tape and Reel, Ultra High Temperature, 8LD PDFN package

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Tel: 91-80-3090-4444
Fax: 91-80-3090-4123

India - New Delhi
Tel: 91-11-4160-8631
Fax: 91-11-4160-8632

India - Pune
Tel: 91-20-2566-1512
Fax: 91-20-2566-1513

Japan - Osaka
Tel: 81-6-6152-7160
Fax: 81-6-6152-9310

Japan - Tokyo
Tel: 81-3-6880-3770
Fax: 81-3-6880-3771

Korea - Daegu
Tel: 82-53-744-4301
Fax: 82-53-744-4302

Korea - Seoul
Tel: 82-2-554-7200
Fax: 82-2-558-5932 or
82-2-558-5934

Malaysia - Kuala Lumpur
Tel: 60-3-6201-9857
Fax: 60-3-6201-9859

Malaysia - Penang
Tel: 60-4-227-8870
Fax: 60-4-227-4068

Philippines - Manila
Tel: 63-2-634-9065
Fax: 63-2-634-9069

Singapore
Tel: 65-6334-8870
Fax: 65-6334-8850

Taiwan - Hsin Chu
Tel: 886-3-5778-366
Fax: 886-3-5770-955

Taiwan - Kaohsiung
Tel: 886-7-213-7828
Fax: 886-7-330-9305

Taiwan - Taipei
Tel: 886-2-2508-8600
Fax: 886-2-2508-0102

Thailand - Bangkok
Tel: 66-2-694-1351
Fax: 66-2-694-1350

EUROPE

Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

Denmark - Copenhagen
Tel: 45-4450-2828
Fax: 45-4485-2829

France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Netherlands - Drunen
Tel: 31-416-690399
Fax: 31-416-690340

Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

UK - Wokingham
Tel: 44-118-921-5869
Fax: 44-118-921-5820

11/29/12

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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