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# FDMT1D3N08B

## N-Channel Dual Cool™ 88 PowerTrench® MOSFET

80 V, 164 A, 1.35 mΩ

### Features

- Max  $r_{DS(on)}$  = 1.35 mΩ at  $V_{GS} = 10$  V,  $I_D = 36$  A
- Max  $r_{DS(on)}$  = 1.8 mΩ at  $V_{GS} = 8$  V,  $I_D = 31$  A
- Advanced Package and Silicon Combination for Low  $r_{DS(on)}$  and High Efficiency
- Next Generation Enhanced Body Diode Technology, Engineered for Soft Recovery
- Low Profile 8x8 mm MLP Package
- MSL1 Robust Package Design
- 100% UIL Tested
- RoHS Compliant

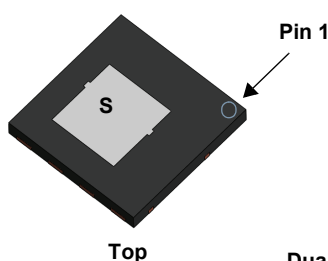


### General Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench® process. Advancements in both silicon and Dual Cool™ package technologies have been combined to offer the lowest  $r_{DS(on)}$  while maintaining excellent switching performance by extremely low Junction-to-Ambient thermal resistance.

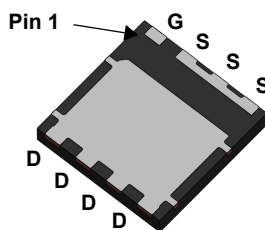
### Applications

- OringFET / Load Switching
- Synchronous Rectification
- DC-DC Conversion

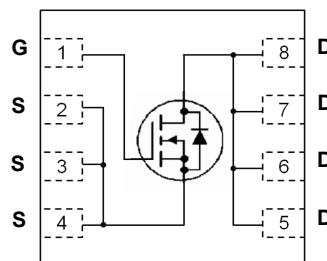


Top

Dual Cool™ 88



Bottom



### MOSFET Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain to Source Voltage	80	V
$V_{GS}$	Gate to Source Voltage	$\pm 20$	V
$I_D$	Drain Current -Continuous $T_C = 25^\circ\text{C}$ (Note 5)	164	A
	-Continuous $T_C = 100^\circ\text{C}$ (Note 5)	103	
	-Continuous $T_A = 25^\circ\text{C}$ (Note 1a)	36	
	-Pulsed (Note 4)	864	
$E_{AS}$	Single Pulse Avalanche Energy (Note 3)	1734	mJ
$P_D$	Power Dissipation $T_C = 25^\circ\text{C}$	178	W
	Power Dissipation $T_A = 25^\circ\text{C}$ (Note 1a)	3.3	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

### Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Top Source)	1.9	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Bottom Drain)	0.7	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1a)	38	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1b)	81	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1i)	15	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1j)	21	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1k)	9	

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
1D3N08B	FDMT1D3N08B	Dual Cool™ 88	13"	13.3 mm	3000 units

# Electrical Characteristics $T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
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## Off Characteristics

$BV_{DSS}$	Drain to Source Breakdown Voltage	$I_D = 250\text{ }\mu\text{A}$ , $V_{GS} = 0\text{ V}$	80			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$ , referenced to $25\text{ }^{\circ}\text{C}$		50		mV/ $^{\circ}\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 64\text{ V}$ , $V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{ V}$ , $V_{DS} = 0\text{ V}$			100	nA

## On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$ , $I_D = 250\text{ }\mu\text{A}$	2.0	3.2	4.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$ , referenced to $25\text{ }^{\circ}\text{C}$		-11		mV/ $^{\circ}\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}$ , $I_D = 36\text{ A}$		1.1	1.35	m $\Omega$
		$V_{GS} = 8\text{ V}$ , $I_D = 31\text{ A}$		1.3	1.8	
		$V_{GS} = 10\text{ V}$ , $I_D = 36\text{ A}$ , $T_J = 125\text{ }^{\circ}\text{C}$		1.8	2.2	
$g_{FS}$	Forward Transconductance	$V_{DS} = 5\text{ V}$ , $I_D = 36\text{ A}$		116		S

## Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 40\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1\text{ MHz}$		14000	19600	pF
$C_{oss}$	Output Capacitance			2050	2870	pF
$C_{rss}$	Reverse Transfer Capacitance			50	150	pF
$R_g$	Gate Resistance		0.1	1.4	2.1	$\Omega$

## Switching Characteristics

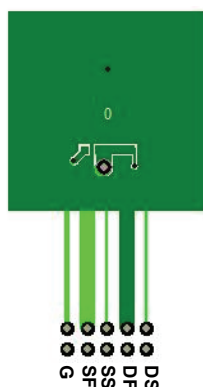
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = 40 V, I <sub>D</sub> = 36 A, V <sub>GS</sub> = 10 V, R <sub>GEN</sub> = 6 Ω			63	101	ns
t <sub>r</sub>	Rise Time				56	90	ns
t <sub>d(off)</sub>	Turn-Off Delay Time				68	109	ns
t <sub>f</sub>	Fall Time				20	32	ns
Q <sub>g(TOT)</sub>	Total Gate Charge	V <sub>GS</sub> = 0 V to 10 V	V <sub>DD</sub> = 40 V, I <sub>D</sub> = 36 A		186	260	nC
Q <sub>g(TOT)</sub>	Total Gate Charge	V <sub>GS</sub> = 0 V to 8 V			152	213	nC
Q <sub>gs</sub>	Gate to Source Charge				67		nC
Q <sub>gd</sub>	Gate to Drain “Miller” Charge				37		nC
Q <sub>oss</sub>	Output Charge	V <sub>DD</sub> = 40 V, V <sub>GS</sub> = 0 V			185		nC

## Drain-Source Diode Characteristics

$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{ V}$ , $I_S = 2.6\text{ A}$ (Note 2)		0.7	1.1	V
		$V_{GS} = 0\text{ V}$ , $I_S = 36\text{ A}$ (Note 2)		0.8	1.2	
$t_{rr}$	Reverse Recovery Time	$I_F = 36\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$		83	132	ns
$Q_{rr}$	Reverse Recovery Charge			90	143	nC

R <sub>θJC</sub>	Thermal Resistance, Junction-to-Case (Top Source)	1.9	°C/W
R <sub>θJC</sub>	Thermal Resistance, Junction-to-Case (Bottom Drain)	0.7	
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient (Note 1a)	38	
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient (Note 1b)	81	
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient (Note 1c)	26	
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient (Note 1d)	34	
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient (Note 1e)	14	
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient (Note 1f)	16	
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient (Note 1g)	26	
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient (Note 1h)	60	
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient (Note 1i)	15	
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient (Note 1j)	21	
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient (Note 1k)	9	
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient (Note 1l)	11	

1.  $R_{\theta JA}$  is determined with the device mounted on a FR-4 board using a specified pad of 2 oz copper as shown below.  $R_{\theta CA}$  is determined by the user's board design.



a. 38 °C/W when mounted on  
a 1 in<sup>2</sup> pad of 2 oz copper



b. 81 °C/W when mounted on  
a minimum pad of 2 oz copper

- c. Still air, 20.9x10.4x12.7mm Aluminum Heat Sink, 1 in<sup>2</sup> pad of 2 oz copper
- d. Still air, 20.9x10.4x12.7mm Aluminum Heat Sink, minimum pad of 2 oz copper
- e. Still air, 45.2x41.4x11.7mm Aavid Thermalloy Part # 10-L41B-11 Heat Sink, 1 in<sup>2</sup> pad of 2 oz copper
- f. Still air, 45.2x41.4x11.7mm Aavid Thermalloy Part # 10-L41B-11 Heat Sink, minimum pad of 2 oz copper
- g. 200FPM Airflow, No Heat Sink, 1 in<sup>2</sup> pad of 2 oz copper
- h. 200FPM Airflow, No Heat Sink, minimum pad of 2 oz copper
- i. 200FPM Airflow, 20.9x10.4x12.7mm Aluminum Heat Sink, 1 in<sup>2</sup> pad of 2 oz copper
- j. 200FPM Airflow, 20.9x10.4x12.7mm Aluminum Heat Sink, minimum pad of 2 oz copper
- k. 200FPM Airflow, 45.2x41.4x11.7mm Aavid Thermalloy Part # 10-L41B-11 Heat Sink, 1 in<sup>2</sup> pad of 2 oz copper
- l. 200FPM Airflow, 45.2x41.4x11.7mm Aavid Thermalloy Part # 10-L41B-11 Heat Sink, minimum pad of 2 oz copper

2. Pulse Test: Pulse Width < 300  $\mu$ s, Duty cycle < 2.0%.
3. E<sub>AS</sub> of 1734 mJ is based on starting T<sub>J</sub> = 25 °C; N-ch: L = 3 mH, I<sub>AS</sub> = 34 A, V<sub>DD</sub> = 80 V, V<sub>GS</sub> = 10 V. 100% test at L = 0.3 mH, I<sub>AS</sub> = 77 A.
4. Pulsed Id please refer to Fig 11 SOA graph for more details.
5. Computed continuous current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro-mechanical application board design.

## Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted.

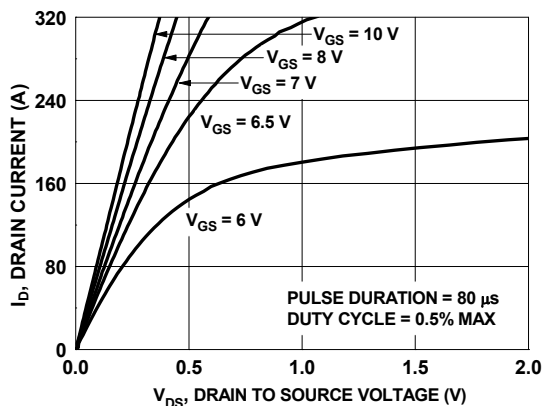


Figure 1. On Region Characteristics

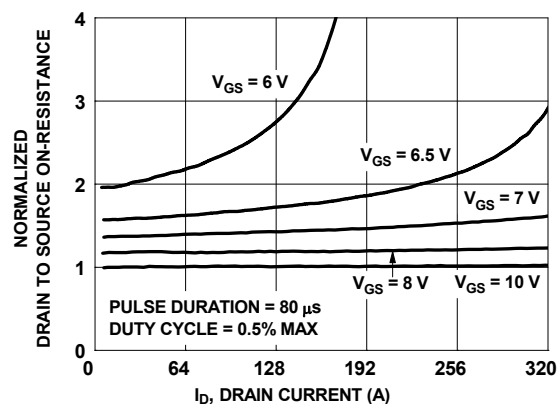


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

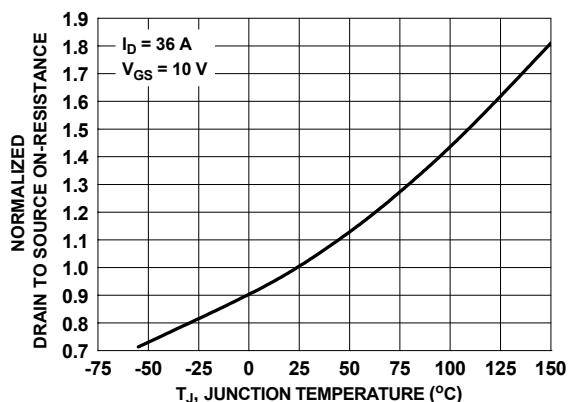


Figure 3. Normalized On Resistance vs. Junction Temperature

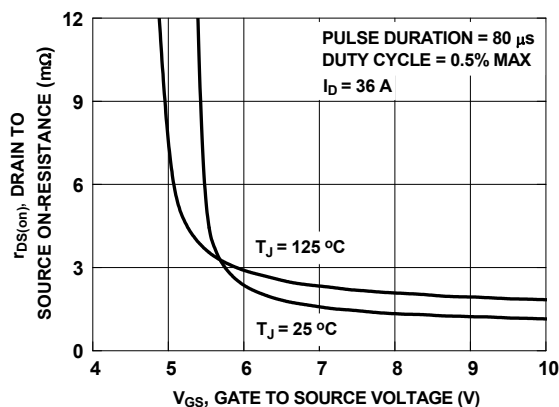


Figure 4. On-Resistance vs. Gate to Source Voltage

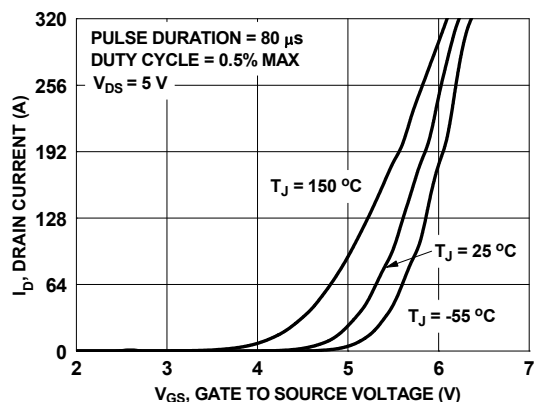


Figure 5. Transfer Characteristics

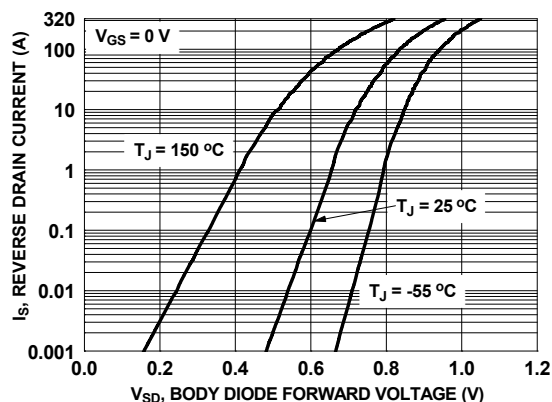


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

# Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted.

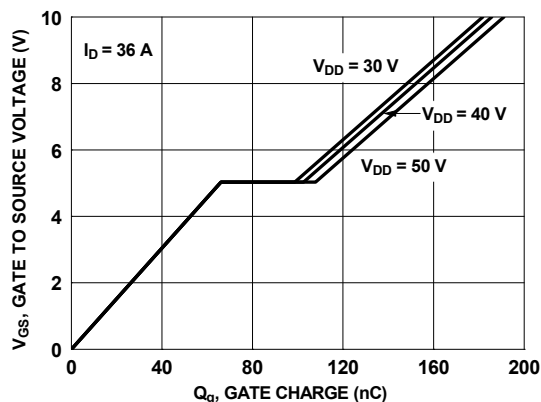


Figure 7. Gate Charge Characteristics

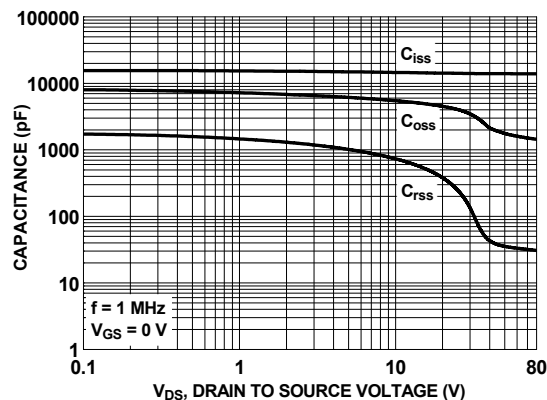


Figure 8. Capacitance vs. Drain to Source Voltage

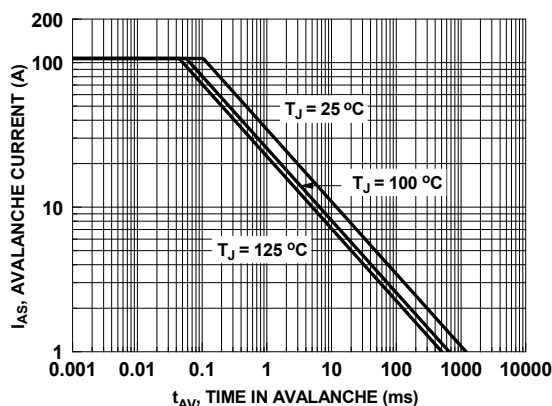


Figure 9. Unclamped Inductive Switching Capability

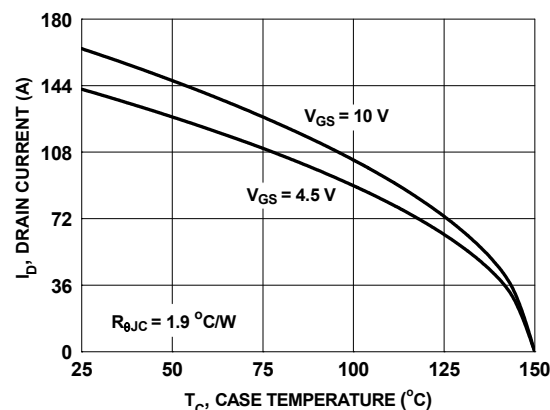


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

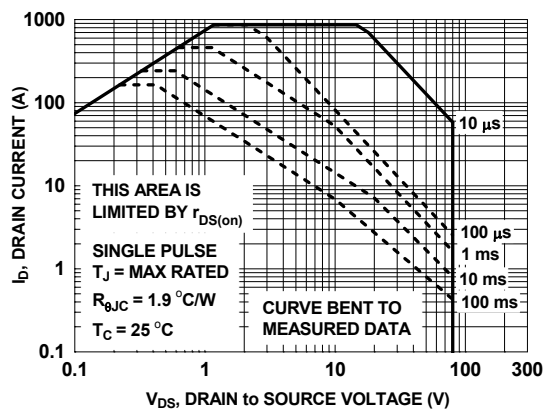


Figure 11. Forward Bias Safe Operating Area

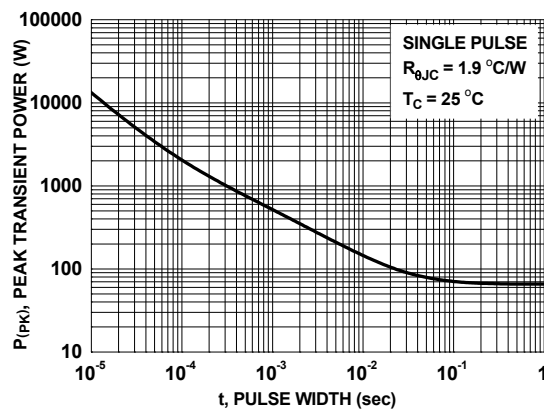
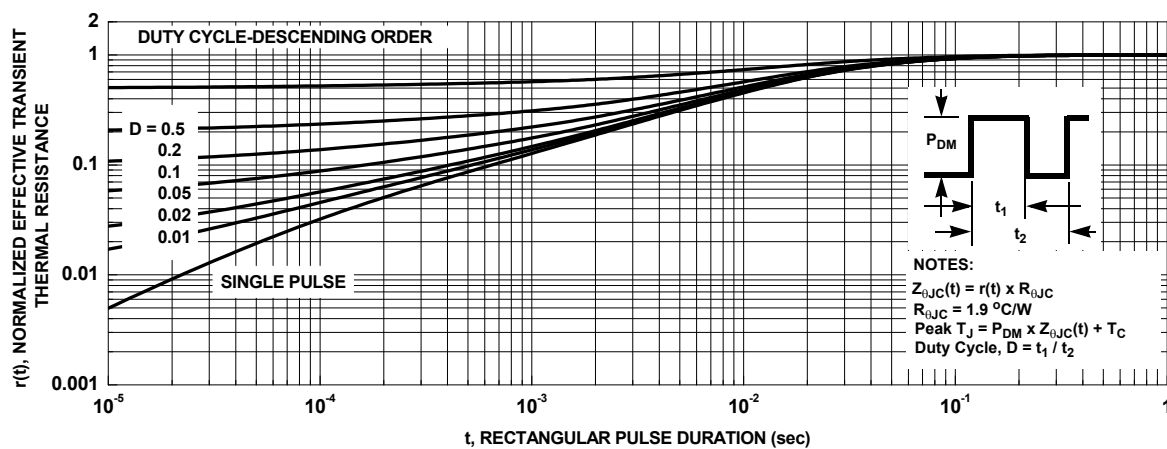


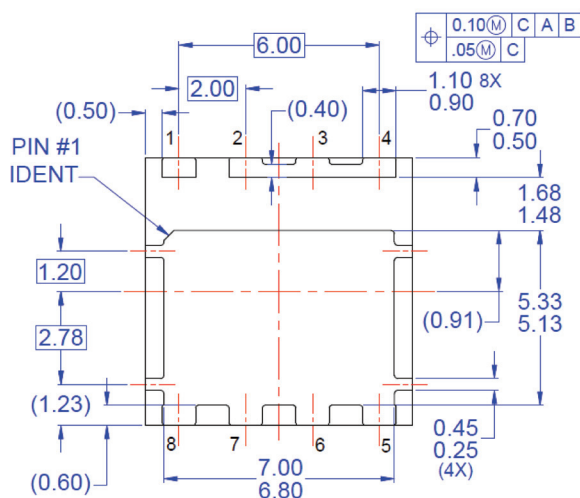
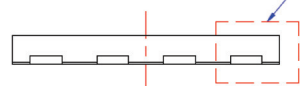
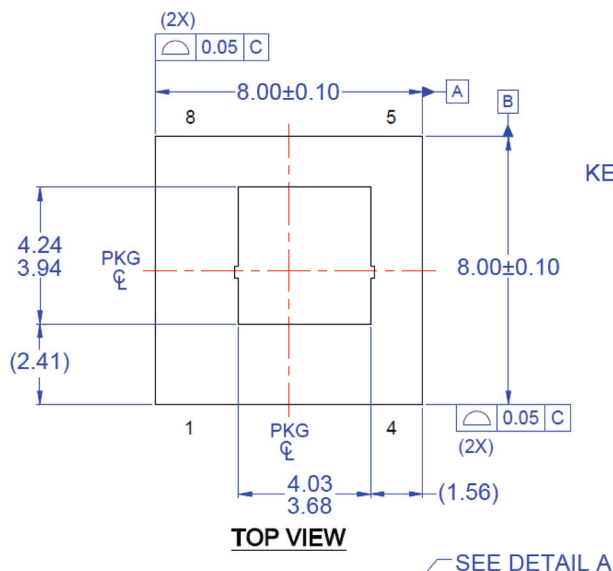
Figure 12. Single Pulse Maximum Power Dissipation

# **Typical Characteristics** $T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise noted.

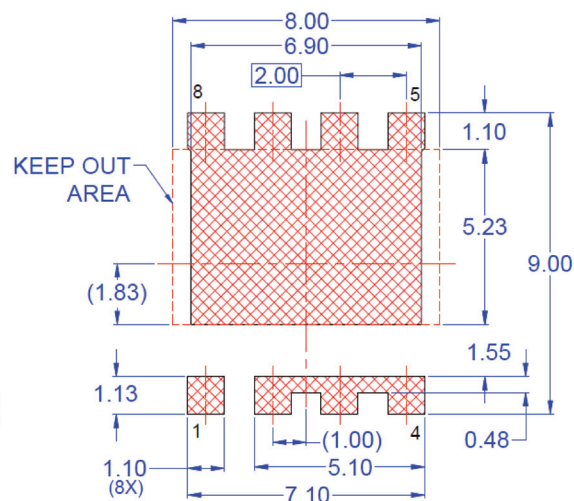


**Figure 13. Junction-to-Case Transient Thermal Response Curve**

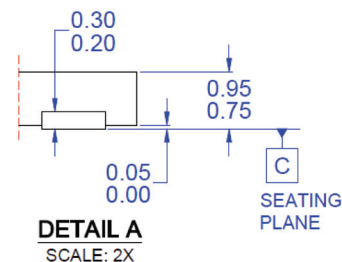
# Dimensional Outline and Pad Layout



**BOTTOM VIEW**



**LAND PATTERN RECOMMENDATION**

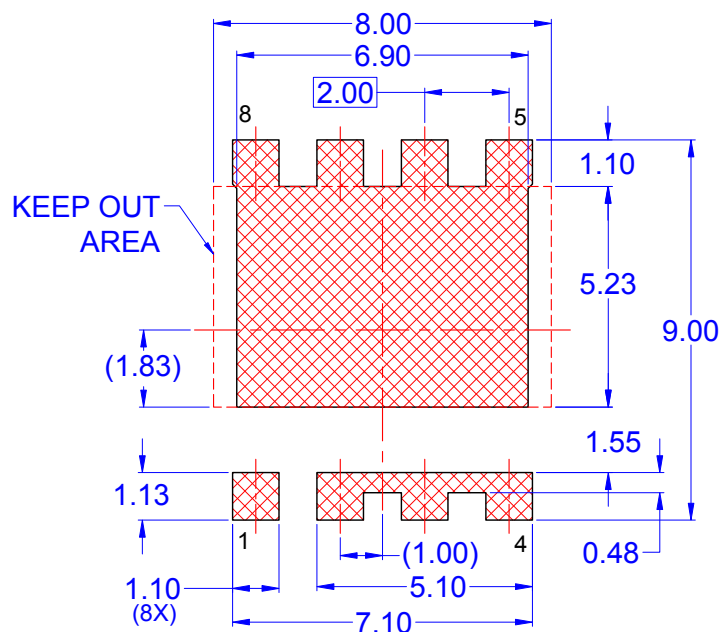
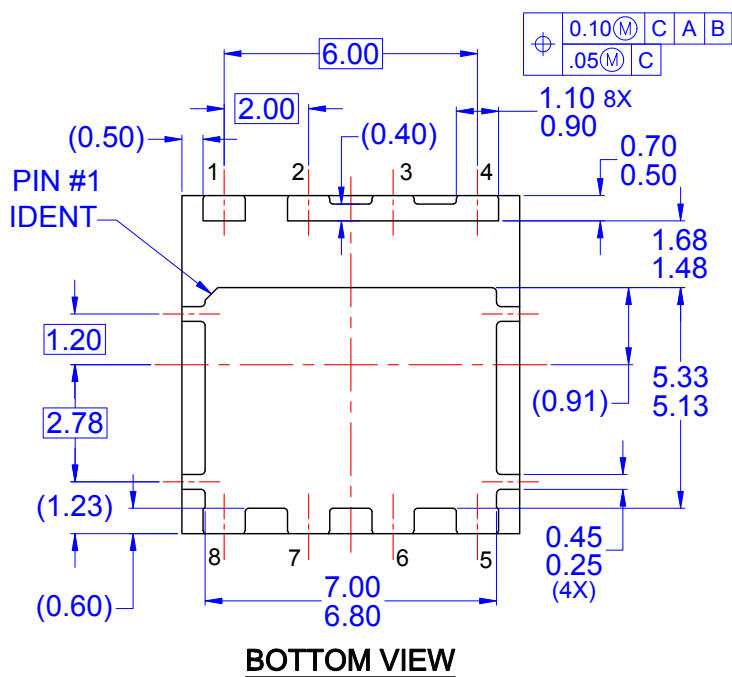
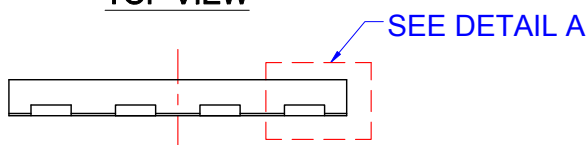
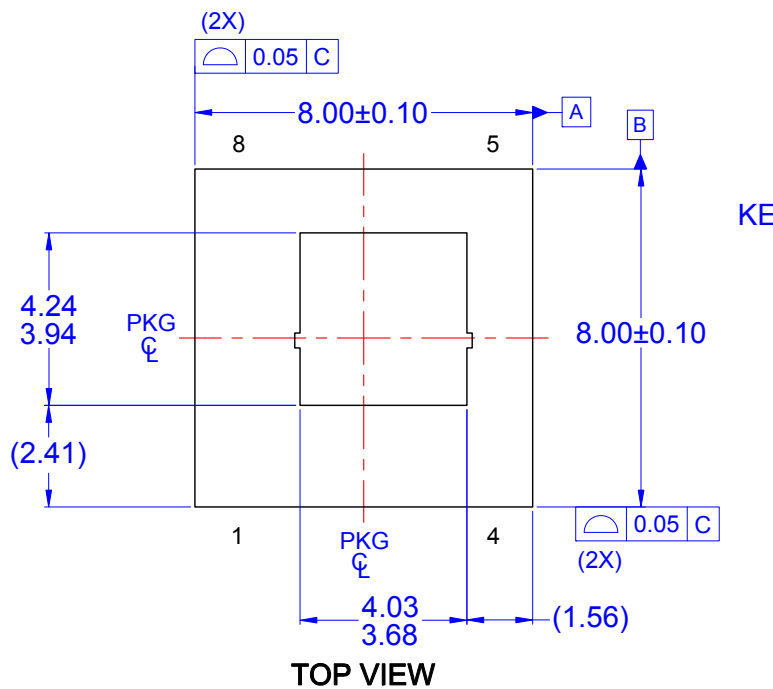


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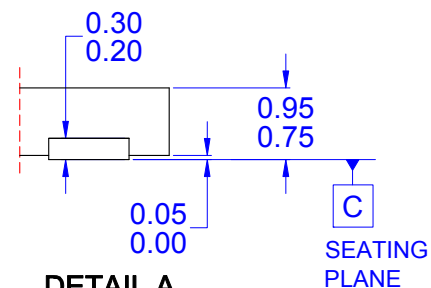
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Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

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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