

FDM2452NZ

Monolithic Common Drain N-Channel 2.5V Specified PowerTrench® MOSFET

General Description

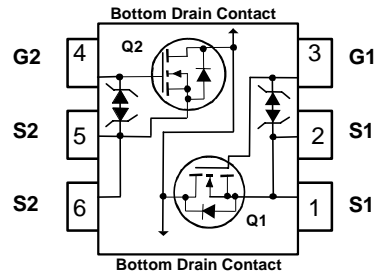
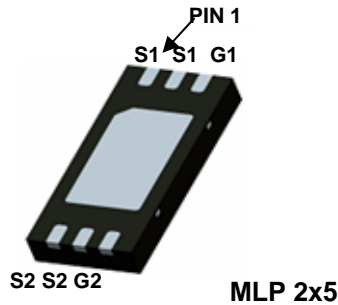
This dual N-Channel MOSFET has been designed using Fairchild Semiconductor's advanced Power Trench process to optimize the $R_{DS(ON)}$ @ $V_{GS} = 2.5V$ on special MicroFET lead frame with all the drains on one side of the package.

Applications

- Li-Ion Battery Pack

Features

- 8.1 A, 30 V $R_{DS(ON)} = 21\text{ m}\Omega$ @ $V_{GS} = 4.5\text{ V}$
 $R_{DS(ON)} = 25\text{ m}\Omega$ @ $V_{GS} = 2.5\text{ V}$
- ESD protection Diode(note 3)
- Low Profile – 0.8 mm maximum – in the new package MicroFET 2 x 5 mm



Absolute Maximum Ratings T_A=25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 12	V
I_D	Drain Current – Continuous (Note 1a)	8.1	A
		30	
P_D	Power Dissipation (Steady State) (Note 1a)	2.2	W
		0.8	
T_J, T_{STG}	Operating and Storage Junction Temperature Range (Note 1b)	-55 to +150	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1a)	55	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1b)	145	

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
2452Z	FDM2452NZ	13"	12mm	3000 units

Electrical Characteristics

$T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C		24		$\text{mV}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}$			1	μA
I_{GSS}	Gate-Body Leakage,	$V_{GS} = \pm 12\text{ V}, V_{DS} = 0\text{ V}$			± 10	μA

On Characteristics (Note 2)

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	0.55	0.8	1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C		-3		$\text{mV}/^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 4.5\text{ V}, I_D = 8.1\text{ A}$ $V_{GS} = 4.0\text{ V}, I_D = 8.0\text{ A}$ $V_{GS} = 3.1\text{ V}, I_D = 7.7\text{ A}$ $V_{GS} = 2.5\text{ V}, I_D = 7.4\text{ A}$ $V_{GS} = 4.5\text{ V}, I_D = 8.1\text{ A}, T_J = 125^\circ\text{C}$		13.6 13.9 14.6 15.7 19	21 21.5 23 25 31	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS} = 5\text{ V}, I_D = 8.1\text{ A}$		46		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$		980		pF
C_{oss}	Output Capacitance			160		pF
C_{riss}	Reverse Transfer Capacitance			110		pF
R_G	Gate Resistance		$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}$	1.8		Ω

Switching Characteristics (Note 2)

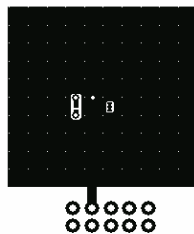
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 15\text{ V}, I_D = 1\text{ A},$ $V_{GS} = 4.5\text{ V}, R_{GEN} = 6\ \Omega$		9	18	ns
t_r	Turn-On Rise Time			10	20	ns
$t_{d(off)}$	Turn-Off Delay Time			30	48	ns
t_f	Turn-Off Fall Time			8.7	17	ns
Q_g	Total Gate Charge	$V_{DS} = 15\text{ V}, I_D = 8.1\text{ A},$ $V_{GS} = 4.5\text{ V}$		14	19	nC
Q_{gs}	Gate-Source Charge			1.8		nC
Q_{gd}	Gate-Drain Charge			3.8		nC

Drain-Source Diode Characteristics

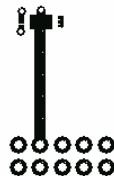
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 1.8\text{ A}$ (Note 2)		0.7	1.2	V
t_{rr}	Diode Reverse Recovery Time	$I_F = 8.1\text{ A},$ $dI_F/dt = 100\text{ A}/\mu\text{s}$		15		nS
Q_{rr}	Diode Reverse Recovery Charge			4		nC

Notes:

- $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



- a) $55^\circ\text{C}/\text{W}$ when mounted on a 1 in^2 pad of 2 oz copper



- b) $145^\circ\text{C}/\text{W}$ when mounted on a minimum pad of 2 oz copper
Scale 1 : 1 on letter size paper

- Pulse Test: Pulse Width < $300\ \mu\text{s}$, Duty Cycle < 2.0%

- The diode connected between the gate and source serves only as protection against ESD. No gate overvoltage rating is implied.

Typical Characteristics

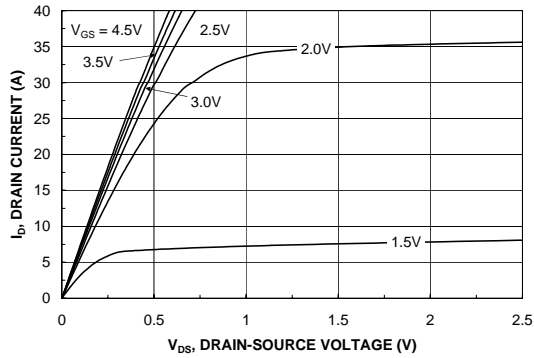


Figure 1. On-Region Characteristics.

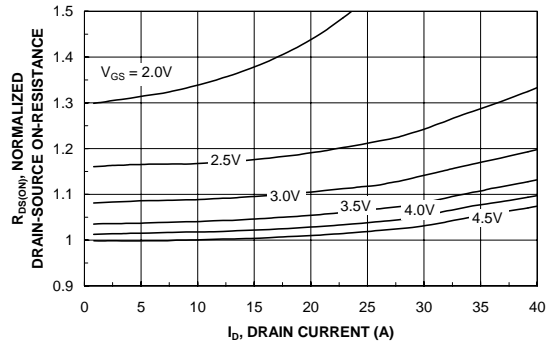


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

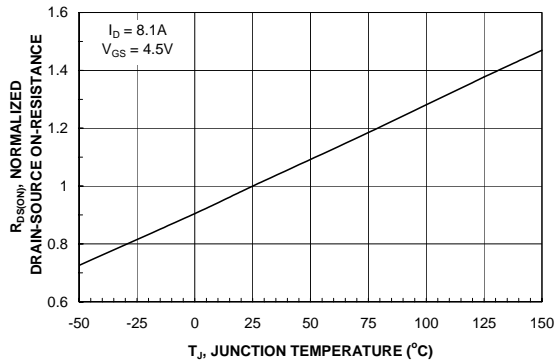


Figure 3. On-Resistance Variation with Temperature.

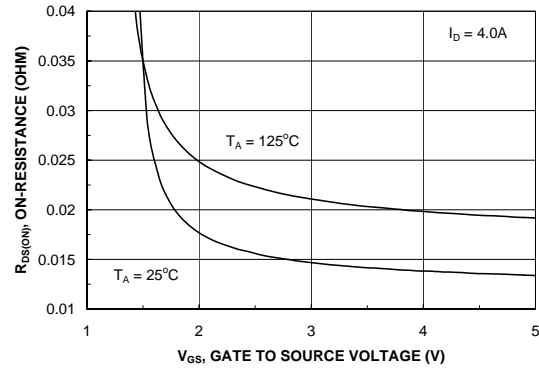


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

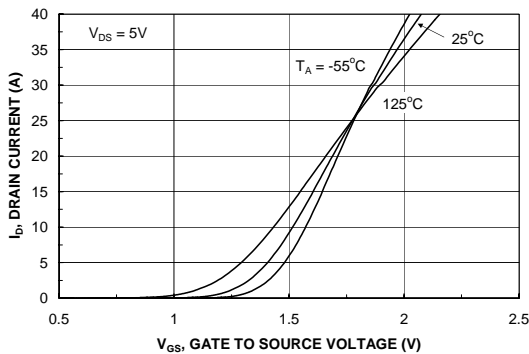


Figure 5. Transfer Characteristics.

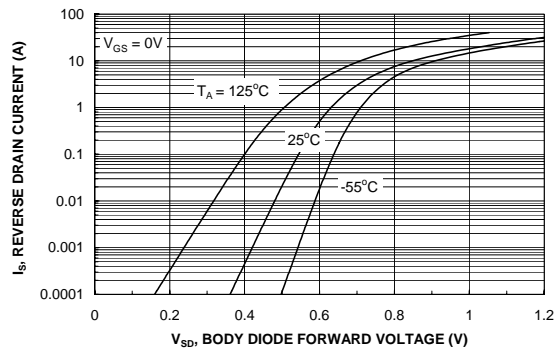


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

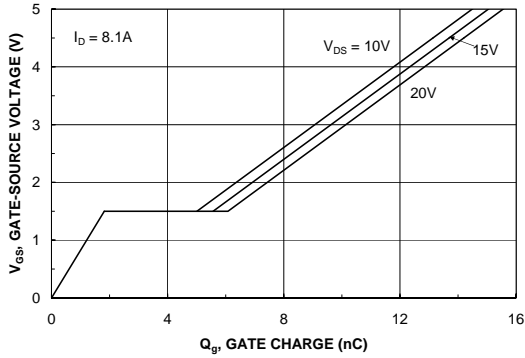


Figure 7. Gate Charge Characteristics.

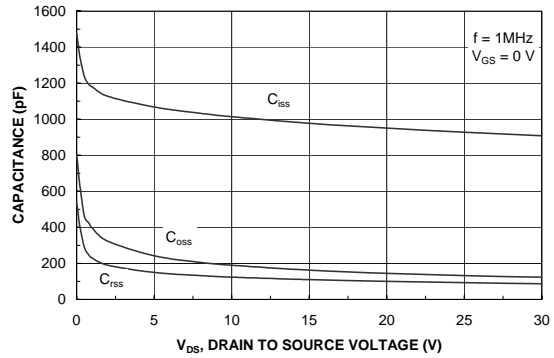


Figure 8. Capacitance Characteristics.

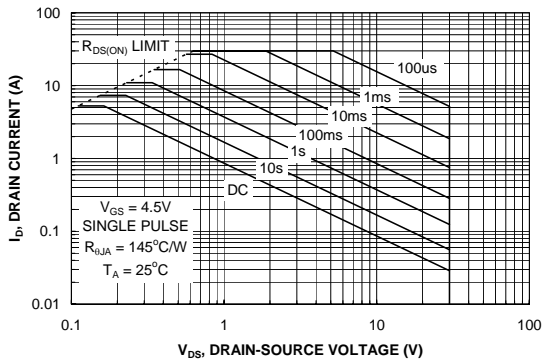


Figure 9. Maximum Safe Operating Area.

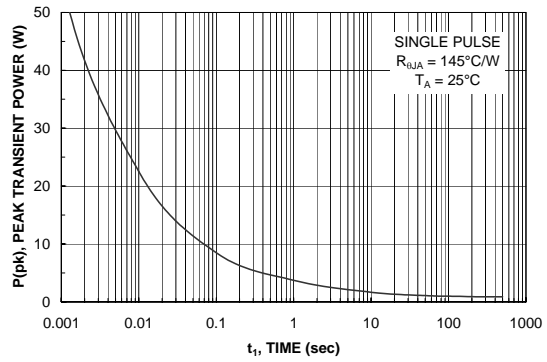


Figure 10. Single Pulse Maximum Power Dissipation.

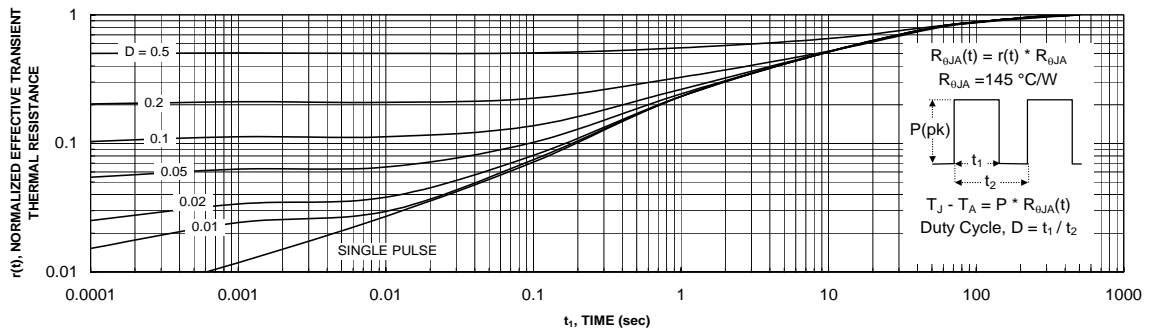
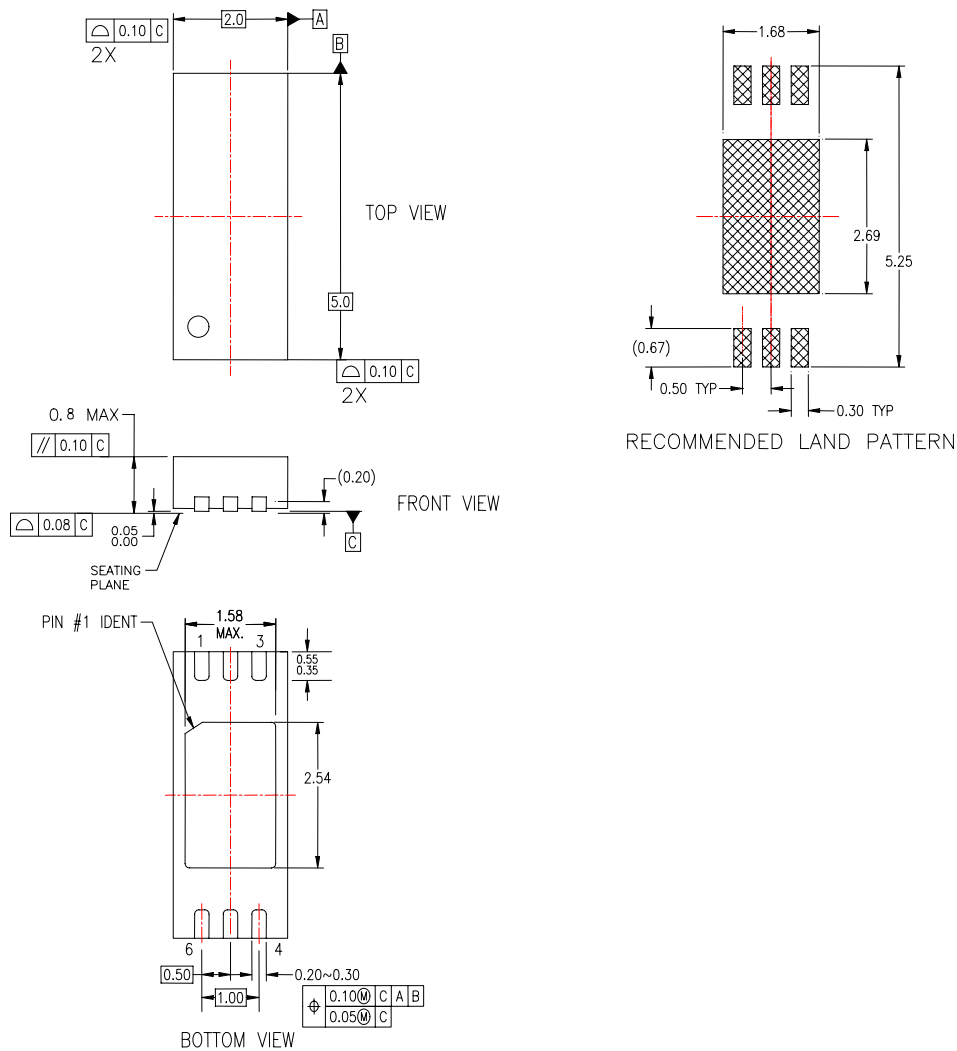


Figure 11. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 1b.
Transient thermal response will change depending on the circuit board design.

Dimensional Outline and Pad Layout



NOTES:

- A. NON-STANDARD JEDEC REGISTERED MOLDED PACKAGE OUTLINE.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994

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