

MT2411

P-Channel Enhancement Mode Field Effect Transistor

Product Summary

- $V_{DS} = -12V$
- $I_D = -20A$
- $R_{DS(ON)} = 6.6m\Omega @ V_{GS} = -4.5V$
- $R_{DS(ON)} = 8.1m\Omega @ V_{GS} = -3.0V$
- $R_{DS(ON)} = 9.2m\Omega @ V_{GS} = -2.5V$
- $R_{DS(ON)} = 13.7m\Omega @ V_{GS} = -1.8V$

Features

- Advanced Trench Process Technology.
- High Density Cell Design for Ultra Low On-Resistance.
- Lead free product is acquired.
- RoHS Compliant.
- ESD protection

Applications

- Battery path load switch
- System load switch

Absolute Maximum Ratings ($T_A = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-12	V
Gate-Source Voltage	V_{GS}	± 8	V
Drain Current-Continuous	I_D	-20	A
Drain Current-Pulsed ^(Note 1)	I_{DM}	-80	A
Maximum Power Dissipation	P_D	3.2	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Resistance Ratings

Symbol	Parameter	Typical	Maximum	Unit	
R_{thJA}	Maximum Junction-to-Ambient ¹	$t \leq 10$ Sec	20	25	$^\circ C/W$
		Steady State	45	55	

Notes:

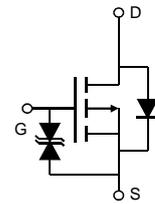
1. Surface Mounted on 1" x 1" FR4 Board.
2. Pulse width limited by maximum junction temperature.



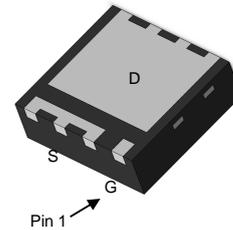
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Simplified Schematic



MARKING DIAGRAM & PIN ASSIGNMENT



DFN2X2

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$	-12			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-12\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			-1 -5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 8\text{V}$			± 10	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=-250\mu\text{A}$	-0.3	-0.6	-0.9	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=-4.5\text{V}$, $I_D=-12\text{A}$ $T_J=125^\circ\text{C}$		6.6	8.0	$\text{m}\Omega$
				8.6	10.4	
		$V_{GS}=-3.0\text{V}$, $I_D=-11\text{A}$		8.1	10.2	$\text{m}\Omega$
		$V_{GS}=-2.5\text{V}$, $I_D=-10\text{A}$		9.2	11.6	$\text{m}\Omega$
		$V_{GS}=-1.8\text{V}$, $I_D=-8\text{A}$		13.7	17.5	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=-5\text{V}$, $I_D=-12\text{A}$		60		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}$, $V_{GS}=0\text{V}$		-0.59	-1	V
I_S	Maximum Body-Diode Continuous Current				-7	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=-6\text{V}$, $f=1\text{MHz}$		2180		pF
C_{oss}	Output Capacitance			675		pF
C_{riss}	Reverse Transfer Capacitance			425		pF
R_g	Gate resistance	$f=1\text{MHz}$		13.5		Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	$V_{GS}=-4.5\text{V}$, $V_{DS}=-6\text{V}$, $I_D=-12\text{A}$		20	30	nC
Q_{gs}	Gate Source Charge			4		nC
Q_{gd}	Gate Drain Charge			5.5		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=-4.5\text{V}$, $V_{DS}=-6\text{V}$, $R_L=0.5\Omega$, $R_{GEN}=3\Omega$		15		ns
t_r	Turn-On Rise Time			45		ns
$t_{D(off)}$	Turn-Off DelayTime			135		ns
t_f	Turn-Off Fall Time			185		ns
t_{rr}	Body Diode Reverse Recovery Time		$I_F=-12\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		28	
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=-12\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		13		nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The value in any given application depends on the user's specific board design.

B. The power dissipation P_D is based on $T_{J(MAX)}=150^\circ\text{C}$, using $\leq 10\text{s}$ junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=150^\circ\text{C}$. Ratings are based on low frequency and duty cycles to keep initial $T_J=25^\circ\text{C}$.

D. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using $<300\mu\text{s}$ pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, assuming a maximum junction temperature of $T_{J(MAX)}=150^\circ\text{C}$. The SOA curve provides a single pulse rating.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

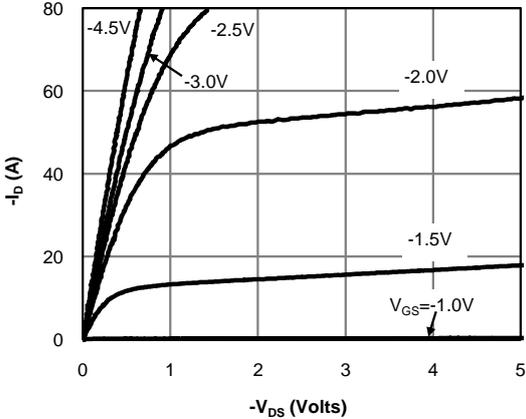


Figure 1: On-Region Characteristics (Note E)

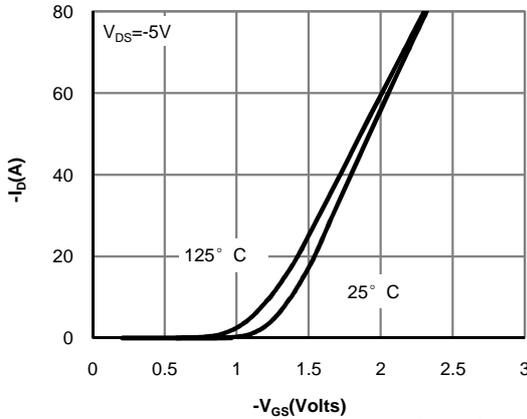


Figure 2: Transfer Characteristics (Note E)

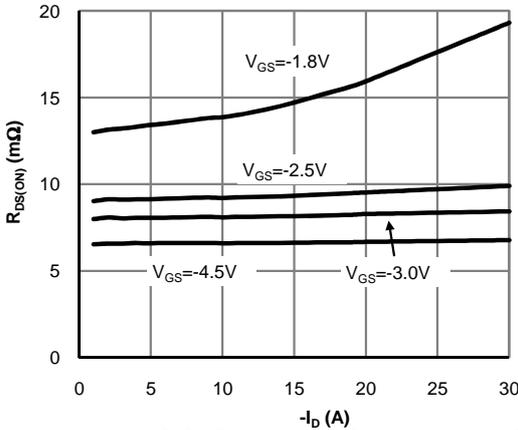


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

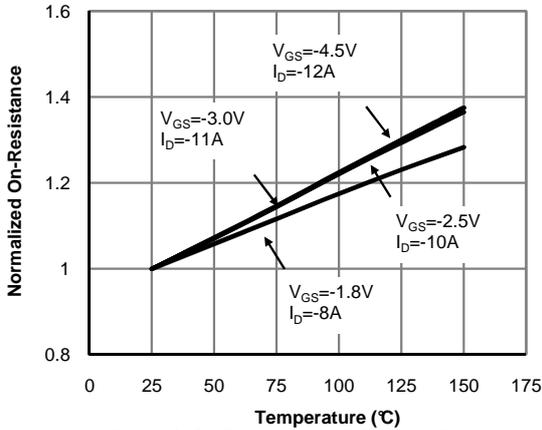


Figure 4: On-Resistance vs. Junction Temperature (Note E)

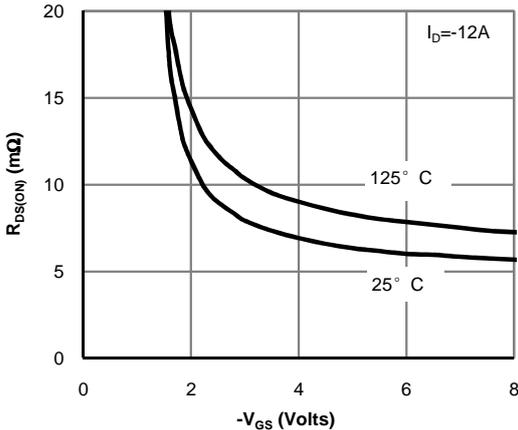


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

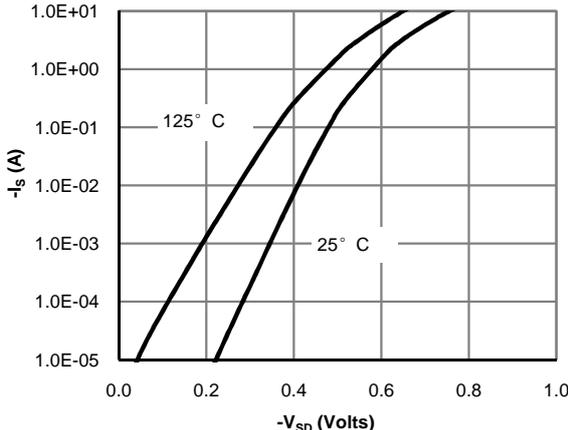


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

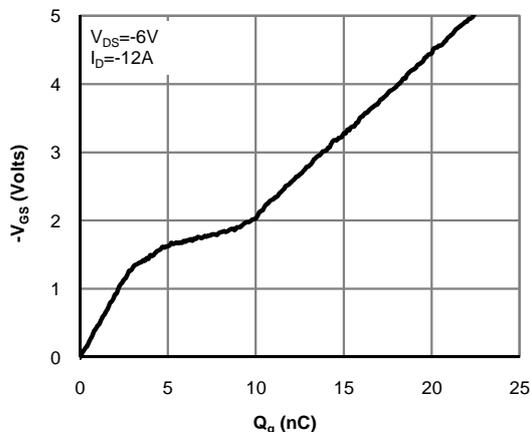


Figure 7: Gate-Charge Characteristics

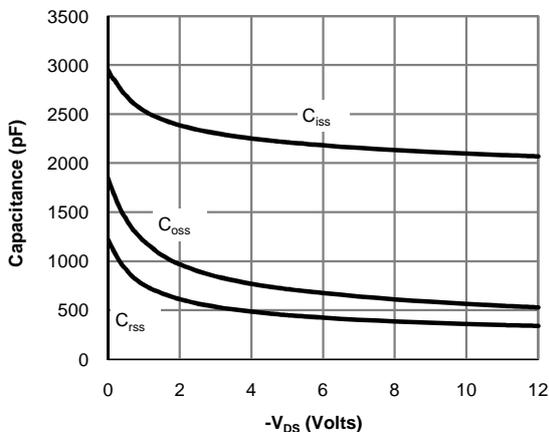


Figure 8: Capacitance Characteristics

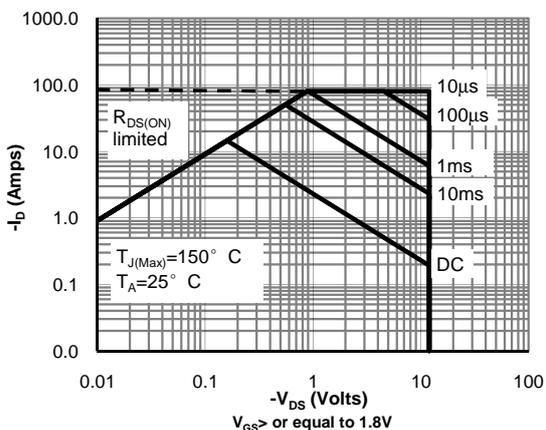


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

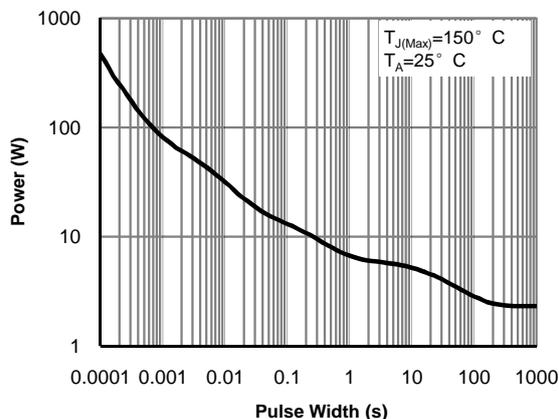


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

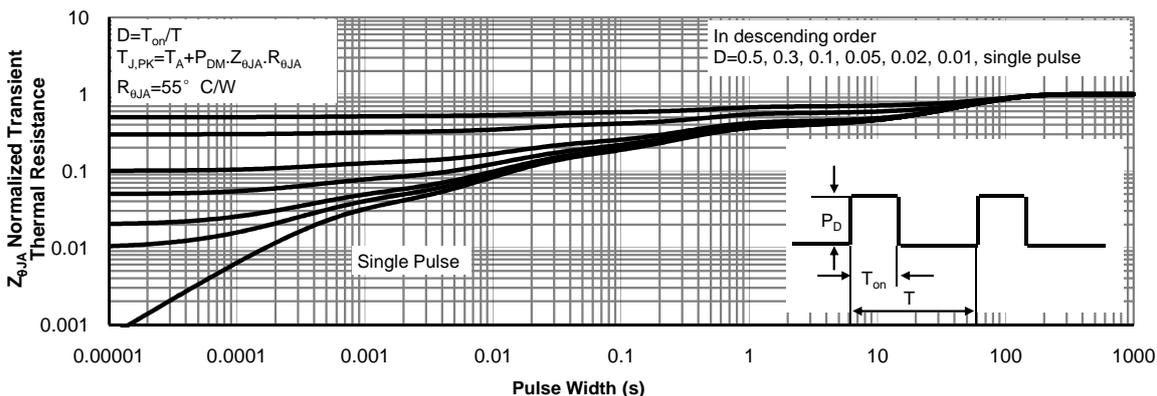
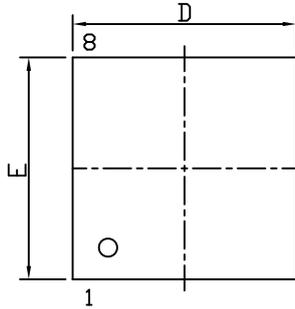
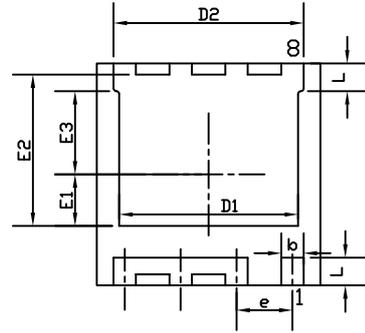


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

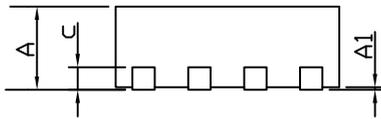
DFN2x2C_8L_EP1_S PACKAGE OUTLINE



TOP VIEW

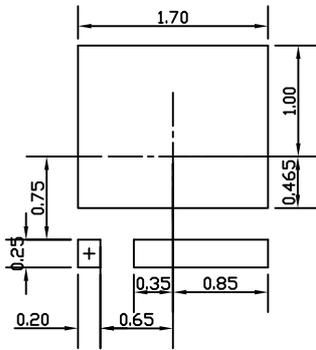


BOTTOM VIEW



SIDE VIEW

RECOMMENDED LAND PATTERN



UNIT: mm

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.75	0.80	0.028	0.030	0.032
A1	0.00	0.02	0.05	0.000	0.001	0.002
b	0.15	0.20	0.25	0.006	0.008	0.010
c	--	0.20 Ref	--	--	0.008 Ref	--
D	1.90	2.00	2.10	0.075	0.079	0.083
D1	1.50	1.60	1.70	0.059	0.063	0.067
D2	1.60	1.70	1.80	0.063	0.067	0.071
E	1.90	2.00	2.10	0.075	0.079	0.083
E1	0.415	0.465	0.515	0.016	0.018	0.020
E2	1.265	1.365	1.465	0.050	0.054	0.058
E3	0.700	0.750	0.800	0.028	0.030	0.032
e	0.50 BSC			0.020 BSC		
L	0.20	0.25	0.30	0.008	0.010	0.012

NOTE

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