N-Channel 30-V (D-S) MOSFET

● FEATURES

$R_{DS(ON)}$≦6mΩ@VGS=10V

$R_{DS(ON)}$≦8mΩ@V_{GS}=4.5V

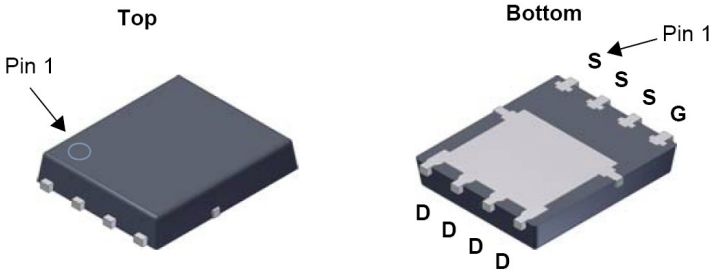
high density cell design for extremely low $R_{DS(ON)}$

Exceptional on-resistance and maximum DC current capability

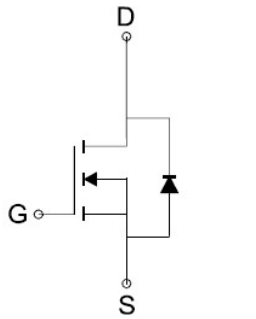
● GENERAL DESCRIPTION

The FS4478 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

● PIN CONFIGURATION



PDFN3×3-8L



N-Channel MOSFET

● Absolute Maximum Ratings (T_A=25℃ Unless Otherwise Noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		VDSS	30	V
Gate-Source Voltage		VGSS	±20	V
Continuous Drain Current(TJ =150℃)*	TA=25℃	ID	30	A
	TA=70℃		23.5	
Pulsed Drain Current		IDM	120	A
Maximum Power Dissipation*	TA=25℃	PD	3.1	W
	TA=70℃		2.0	
Operating Junction Temperature		TJ	-55 to 150	℃
Thermal Resistance-Junction to Ambient*		RθJA	50	℃/W
Thermal Resistance-Junction to Lead*		RθJL	24	

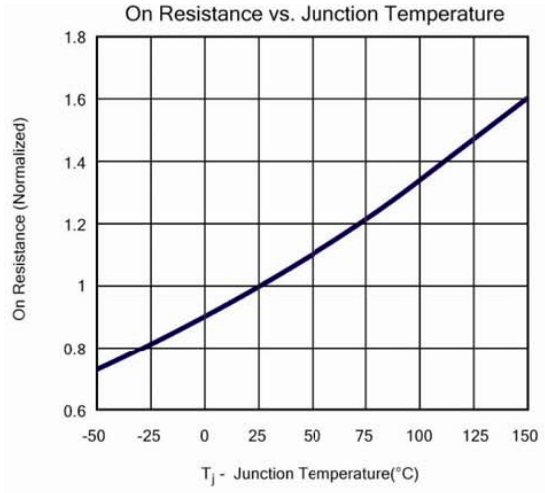
* The device mounted on 1in2 FR4 board with 2 oz copper

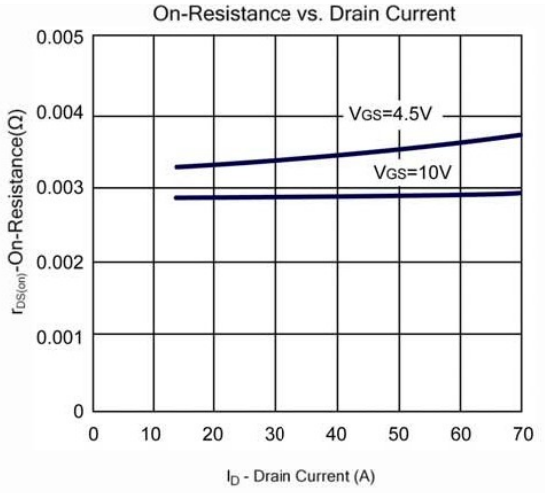
Electrical Characteristics (T_J=25°C unless otherwise noted)

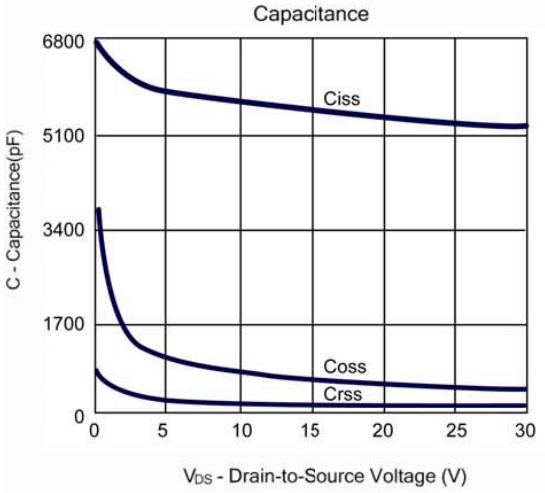
Symbol	Parameter	Limit	Min	Typ	Max	Unit
STATIC						
BVDSS	Drain-Source Breakdown Voltage	VGS=0V, ID=250μA	30			V
VGS(th)	Gate Threshold Voltage	VDS=VGS, ID=250μA	1.55		2.7	V
IGSS	Gate Leakage Current	VDS=0V, VGS=±20V			±100	nA
IDSS	Zero Gate Voltage Drain Current	VDS=30V, VGS=0V			1	μA
RDS(ON)	Drain-Source On-State Resistance a	VGS=10V, ID= 10A		4.6	6.0	mΩ
		VGS=4.5V, ID= 7.5A		6.7	8.0	
VSD	Diode Forward Voltage	IS=2.7A, VGS=0V		0.72	1.1	V
DYNAMIC						
Qg	Total Gate Charge(10V)	VDS=15V, VGS=10V, ID=17A		55		nC
Qg	Total Gate Charge(4.5V)	VDS=15V, VGS=4.5V, ID=17A		29		
Qgs	Gate-Source Charge			10		
Qgd	Gate-Drain Charge			15		
Ciss	Input capacitance	VDS=15V, VGS=0V, f=1.0MHz		3200		pF
Coss	Output Capacitance			550		
Crss	Reverse Transfer Capacitance			210		
Rg	Gate-Resistance	VDS=0V, VGS=0V, f=1MHz		1.2		Ω
td(on)	Turn-On Delay Time	VDD=15V, RL =15Ω ID=1A, VGEN=10V RG=6Ω		23		ns
tr	Turn-On Rise Time			12		
td(off)	Turn-Off Delay Time			86		
tf	Turn-Off Fall Time			12		

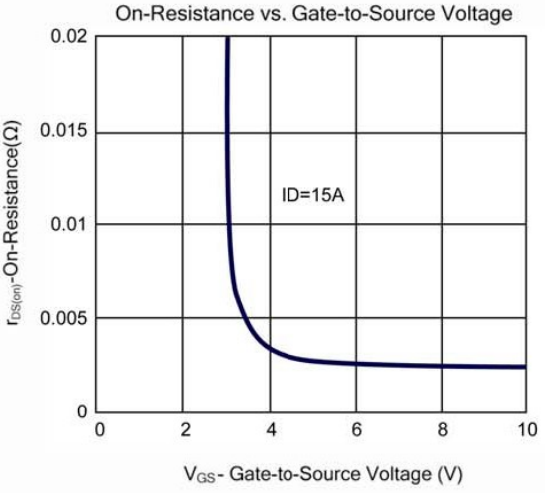
Note:

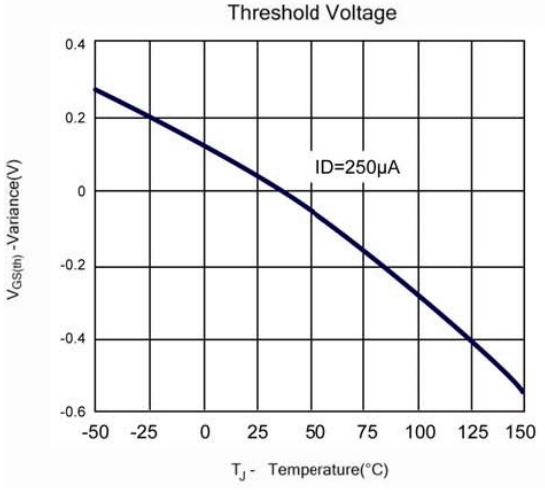
A. The value of RqJA is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with TA =25° C. The Power dissipation PDSM is based on R qJA t≤ 10s and the maximum allowed junction temperature of 150° C. The value in any given application depends on the user's specific board design.
B. The power dissipation PD is based on TJ(MAX)=150° C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
C. Single pulse width limited by junction temperature TJ(MAX)=150° C.
D. The RqJA is the sum of the thermal impedance from junction to case RqJC and case to ambient.
E. The static characteristics in Figures 1 to 6 are obtained using <300ms pulses, duty cycle 0.5% max.
F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of TJ(MAX)=150° C. The SOA curve provides a single pulse rating.
G. The maximum current rating is package limited.
H. These tests are performed with the device mounted on 1 in2 FR-4 board with 2oz. Copper, in a still air environment with TA=25° C.

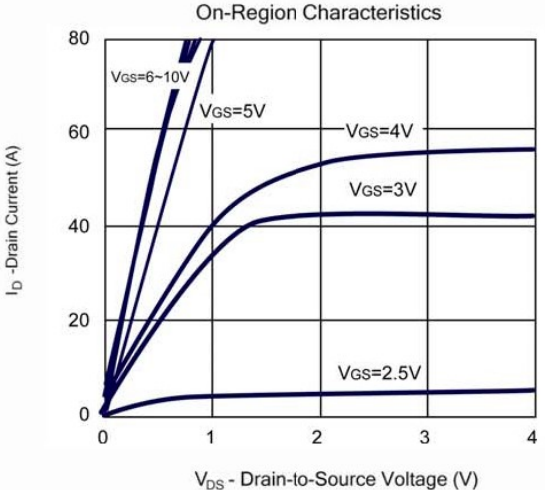

On Resistance vs. Junction Temperature
On Resistance (Normalized)
1.8
1.6
1.4
1.2
1
0.8
0.6
-50 -25 0 25 50 75 100 125 150
Tj - Junction Temperature(°C)


On-Resistance vs. Drain Current
rDS(on)-On-Resistance(Ω)
0.005
0.004
0.003
0.002
0.001
0
VGS=4.5V
VGS=10V
0 10 20 30 40 50 60 70
ID - Drain Current (A)


Capacitance
C - Capacitance(pF)
6800
5100
3400
1700
0
Ciss
Coss
Crss
0 5 10 15 20 25 30
VDS - Drain-to-Source Voltage (V)

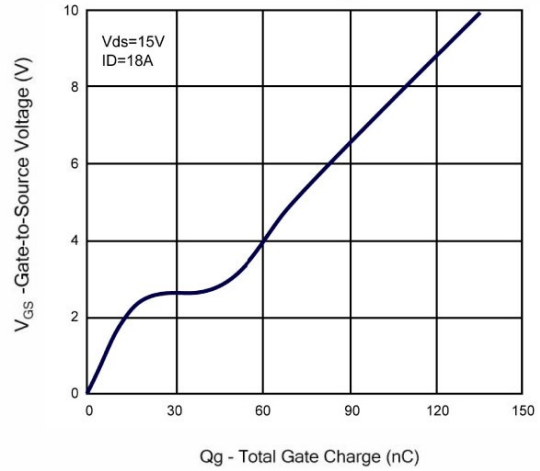

On-Resistance vs. Gate-to-Source Voltage
rDS(on)-On-Resistance(Ω)
0.02
0.015
0.01
0.005
0
ID=15A
0 2 4 6 8 10
VGS - Gate-to-Source Voltage (V)


Threshold Voltage
VGS(th) -Variance(V)
0.4
0.2
0
-0.2
-0.4
-0.6
ID=250μA
-50 -25 0 25 50 75 100 125 150
TJ - Temperature(°C)

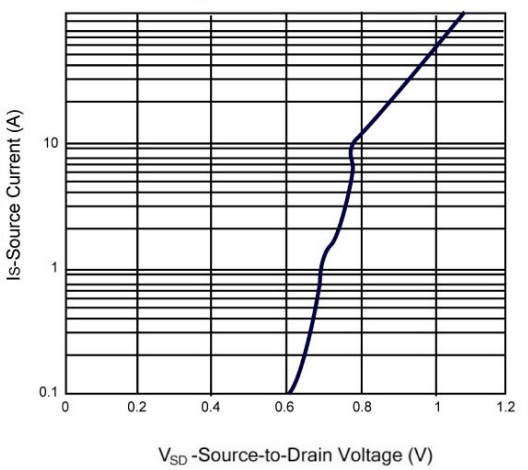

On-Region Characteristics
ID -Drain Current (A)
80
60
40
20
0
VGS=6~10V
VGS=5V
VGS=4V
VGS=3V
VGS=2.5V
0 1 2 3 4
VDS - Drain-to-Source Voltage (V)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

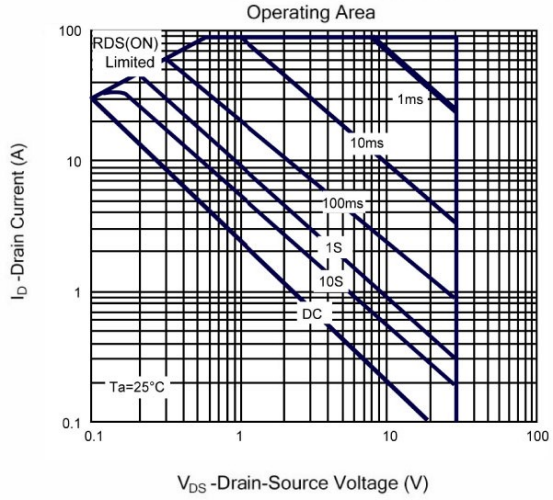
Gate Charge



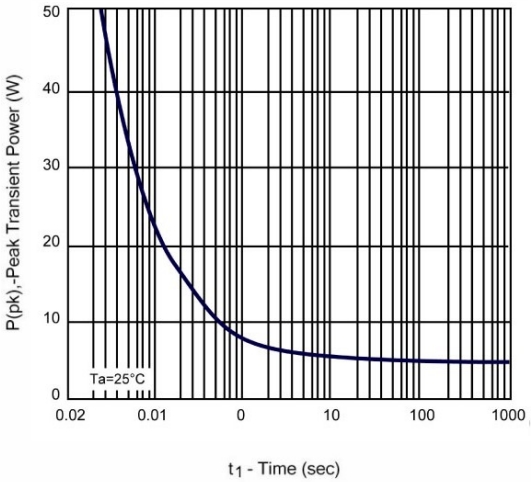
Body-diode characteristics



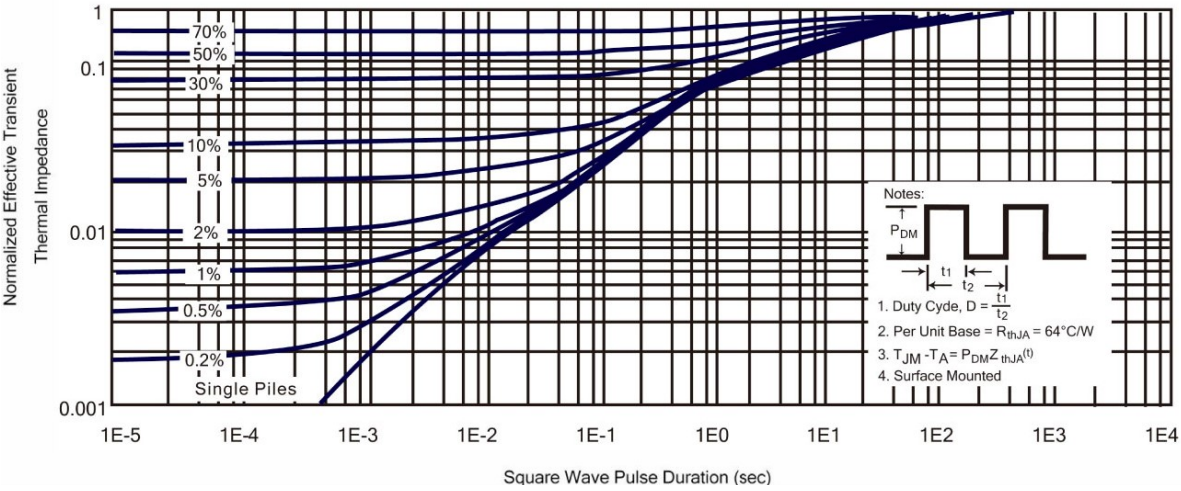
Maximum Forward Biased Safe Operating Area



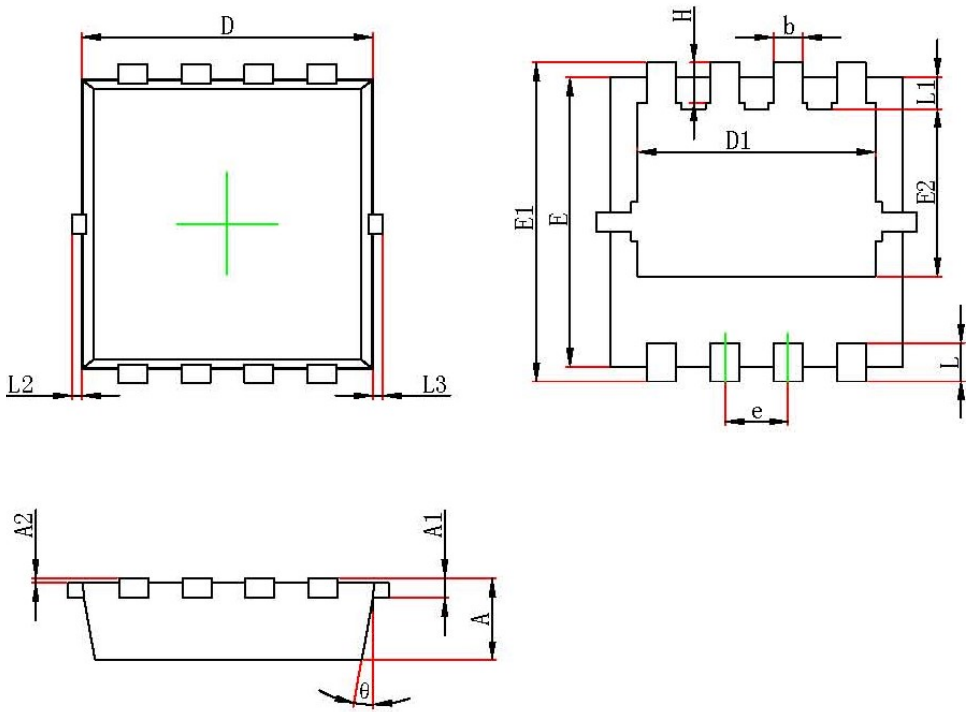
Single Pulse Maximum Power Dissipation



Normalized Thermal Transient Impedance, Junction-to-Ambient



- **PACKAGE PDFN3×3-8L**



DFN3030-8L：mm			
Dim	**Min**	**Max**	**Typ**
A	0.65	0.85	0.75
A1		0.152Ref.	
A2	0	0.05	0.03
D	2.90	3.10	3.00
D1	2.24	2.54	2.39
E	2.90	3.10	3.00
E1	3.15	3.45	3.30
E2	1.23	1.64	1.43
e	0.55	0.75	0.65
b	0.20	0.40	0.30
L	0.30	0.50	0.40
L1	0.18	0.48	0.33
L2	0	0.10	0.05
L3	0	0.10	0.05
H	0.31	0.52	0.42
θ	9°	13°	11°