

## Dual P-Channel -20V MOSFET

### ● FEATURES

RDS(ON) 65mΩ@VGS=-4.5V  
 RDS(ON) 75mΩ@VGS=-2.5V  
 RDS(ON) 80mΩ@VGS=-1.8V TYP

high density cell design for extremely low RDS(ON)  
 Exceptional on-resistance and maximum DC current capability

### ● GENERAL DESCRIPTION

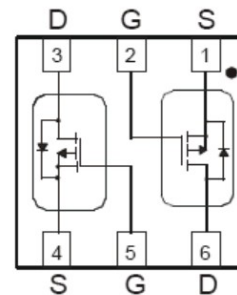
The FS2160 combines advanced trench MOSFET technology with a low resistance package to provide extremely low R<sub>DS(ON)</sub>. This device is ideal for load switch and battery protection applications.

### ● PIN CONFIGURATION

DFN2020B-6



BOTTOM VIEW



TOP VIEW  
Internal Schematic

### Absolute Maximum Ratings (T<sub>A</sub>=25°C Unless Otherwise Noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V <sub>DS</sub>	-20	V
Gate-Source Voltage	V <sub>GS</sub>	±10	V
Drain Current-Continuous	I <sub>D</sub>	-3.8	A
Drain Current -Pulsed (Note )	I <sub>DM</sub>	-13	A
Maximum Power Dissipation	P <sub>D</sub>	18	W
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 To 150	°C

### Thermal Characteristics

Parameter	Symbol	Limit	Units
Thermal Resistance, Junction-to-Case	R <sub>qJC</sub>	6.9	°C/W

#### NOTE:

- A: Surface mounted on FR4 Board using 1 in sq pad size, 1oz Cu.
- B: Surface mounted on FR4 board using the minimum recommended pad size, 1oz Cu.
- C: Repetitive rating, pulse width limited by junction temperature, t<sub>p</sub>=10μs, Duty Cycle=1%
- D: Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C.

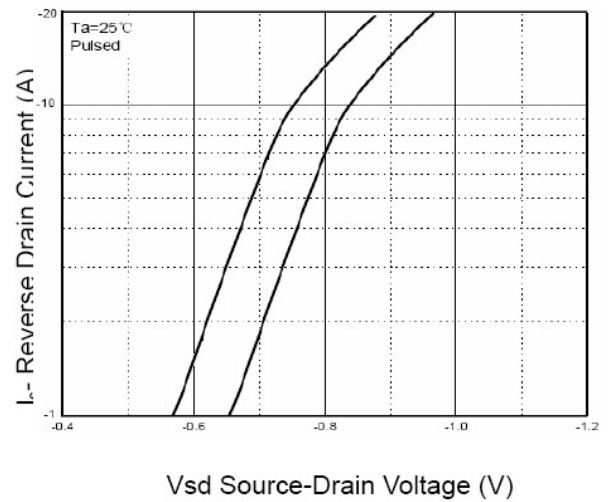
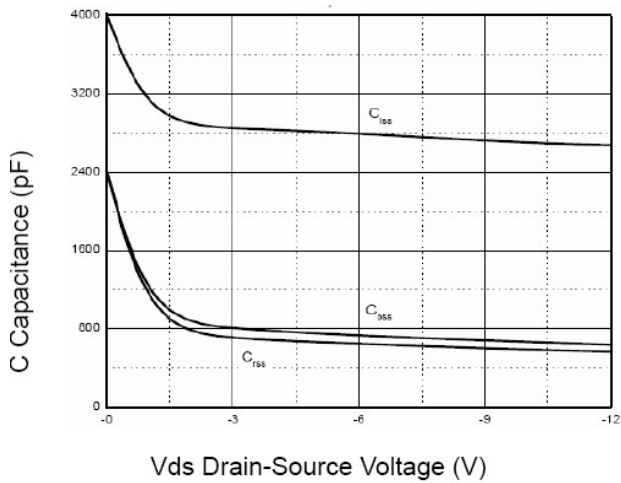
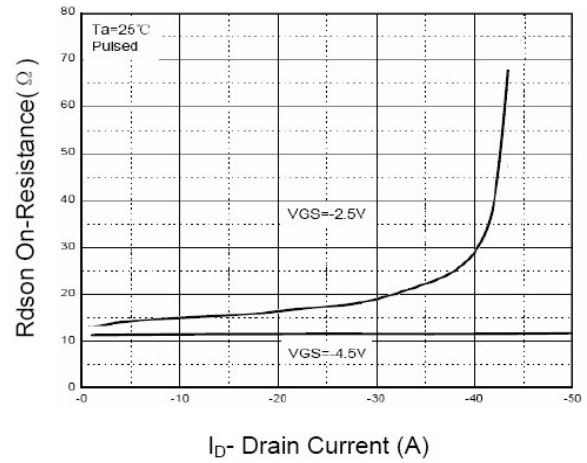
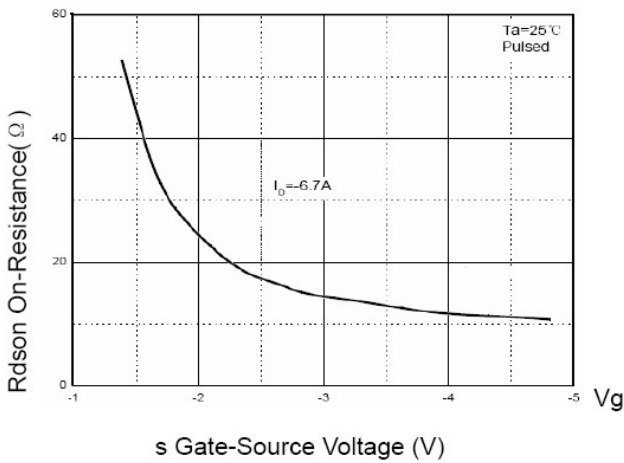
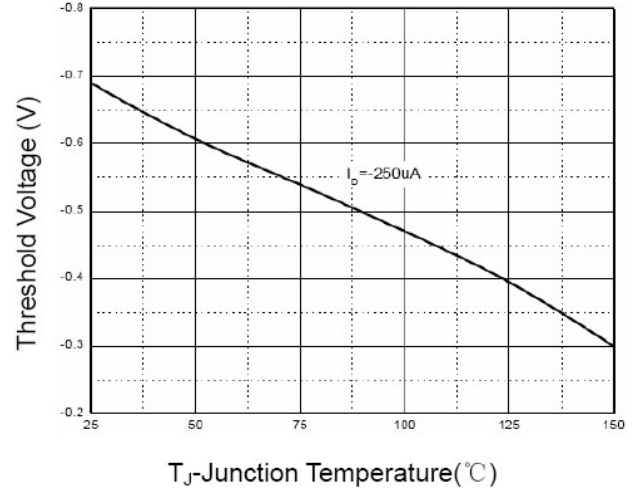
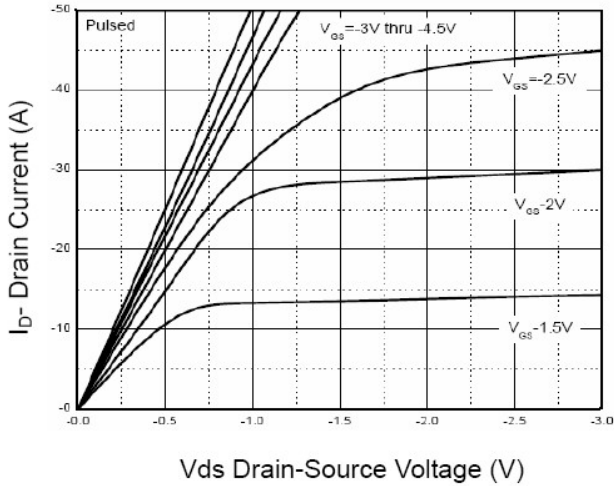
● **Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$  unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-20	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-8V, V_{GS}=0V$	-	-	-1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 8V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.4	-0.7	-1	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-4.5V, I_D=-6.6A$	-	50	65	m $\Omega$
		$V_{GS}=-2.5V, I_D=-3.5A$	-	60	75	m $\Omega$
		$V_{GS}=-1.8V, I_D=-2.0A$	-	80	95	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=-5V, I_D=-6.7A$	20	-	-	S
<b>Dynamic Characteristics</b> (Note4)						
Input Capacitance	$C_{iss}$	$V_{DS}=-10V, V_{GS}=0V, F=1.0MHz$	-	1100	-	PF
Output Capacitance	$C_{oss}$		-	270	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	230	-	PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-10V, I_D=-1A$ $V_{GS}=-4.5V, R_{GEN}=10\Omega$	-	7	-	nS
Turn-on Rise Time	$t_r$		-	20	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	17	-	nS
Turn-Off Fall Time	$t_f$		-	8	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=-6V, I_D=-10A,$ $V_{GS}=-4.5V$	-	24	32	nC
Gate-Source Charge	$Q_{gs}$		-	3	-	nC
Gate-Drain Charge	$Q_{gd}$		-	6	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage(Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=-1A$	-	-	-1.2	V
Diode Forward Current (Note 2)	$I_S$		-	-	-1.6	A

**Notes:**

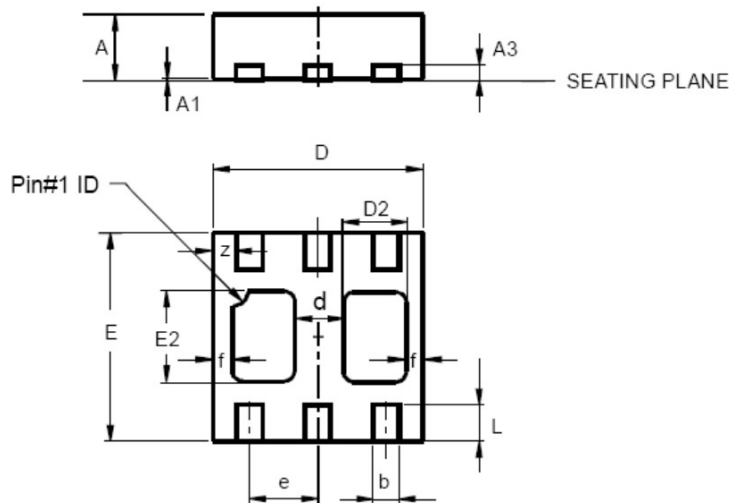
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production

● **Typical Performance Characteristics (T = 25°C)**



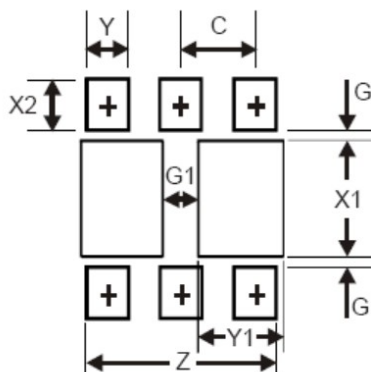
● **DFN2020B-6L Package Information**

Package Outline Dimensions



DFN2020B-6			
Dim	Min	Max	Typ
A	0.545	0.605	0.575
A1	0	0.05	0.02
A3	—	—	0.13
b	0.20	0.30	0.25
D	1.95	2.075	2.00
d	—	—	0.45
D2	0.50	0.70	0.60
e	—	—	0.65
E	1.95	2.075	2.00
E2	0.90	1.10	1.00
f	—	—	0.15
L	0.25	0.35	0.30
z	—	—	0.225
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
Z	1.67
G	0.20
G1	0.40
X1	1.0
X2	0.45
Y	0.37
Y1	0.70
C	0.65

**Notes**

1. All dimensions are in millimeters.
2. Tolerance  $\pm 0.10\text{mm}$  (4 mil) unless otherwise specified
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.