

## 60 N-Channel Enhancement Mode Power MOSFET

### Description

The DMN6013LFGQ uses advanced technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

### General Features

$V_{DS} = 60V$   $I_D = 65A$

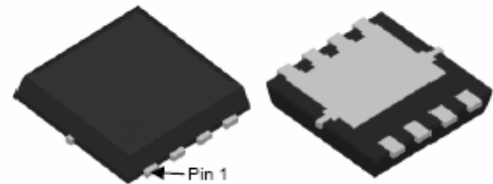
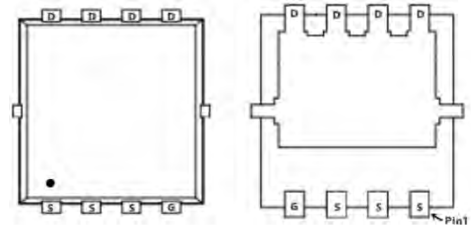
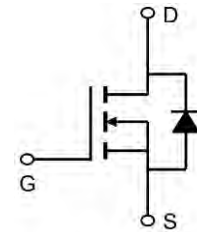
$R_{DS(ON)} < 10m\Omega$  @  $V_{GS}=10V$  (Type: 7.5m $\Omega$ )

### Application

Battery protection

Load switch

Uninterruptible power supply



### Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
DMN6013LFGQ	DFN3*3-8L	AP65N06DF XXX YYYY	5000PCS

### Absolute Maximum Ratings@ $T_j=25^\circ C$ (unless otherwise specified)

Symbol	Parameter	Value	Unit
VDS	Drain source voltage	60	V
VGS	Gate source voltage	$\pm 20$	V
$I_D@T_A=25^\circ C$	Continuous drain current	20	A
$I_D@T_A=70^\circ C$	Continuous drain current	11	A
IDM	Pulsed drain current	60	A
$P_D@T_A=25^\circ C$	Power dissipation	60	W
EAS	Single pulsed avalanche energy	30	mJ
TSTG	Storage Temperature Range	-55 to 150	$^\circ C$
$T_j$	Operation and storage temperature	-55 to 150	$^\circ C$
R $\theta$ JC	Thermal resistance, junction-case	2.1	$^\circ C/W$
R $\theta$ JA	Thermal resistance, junction-ambient <sup>5</sup>	85	$^\circ C/W$

## Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
BVDSS	Drain-source breakdown voltage	V <sub>GS</sub> =0 V, I <sub>D</sub> =250 μA	60	68		V
VGS(th)	Gate threshold voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250 μA	1.2	1.5	2.5	V
RDS(ON)	Drain-source on-state resistance	V <sub>GS</sub> =10 V, I <sub>D</sub> =20 A		7.5	10	mΩ
RDS(ON)	Drain-source on-state resistance	V <sub>GS</sub> =4.5 V, I <sub>D</sub> =10 A		10	13	mΩ
IGSS	Gate-source leakage current	V <sub>GS</sub> =±20 V			±100	nA
IDSS	Drain-source leakage current	V <sub>DS</sub> =60 V, V <sub>GS</sub> =0 V			1	μA
Ciss	Input capacitance	V <sub>GS</sub> =0 V, V <sub>DS</sub> =50 V, f=100 kHz		1182.1		pF
Coss	Output capacitance			199.5		pF
Crss	Reverse transfer capacitance			4.1		pF
td(on)	Turn-on delay time	V <sub>GS</sub> =10 V, V <sub>DS</sub> =50 V, R <sub>G</sub> =2 Ω, I <sub>D</sub> =10 A		17.9		ns
t <sub>r</sub>	Rise time			4.0		ns
td(off)	Turn-off delay time			34.9		ns
t <sub>f</sub>	Fall time			5.5		ns
Q <sub>g</sub>	Total gate charge	I <sub>D</sub> =10 A, V <sub>DS</sub> =50 V, V <sub>GS</sub> =10 V		18.4		nC
Q <sub>gs</sub>	Gate-source charge			3.3		nC
Q <sub>gd</sub>	Gate-drain charge			3.1		nC
V <sub>plateau</sub>	Gate plateau voltage			2.8		V
I <sub>S</sub>	Diode forward current	V <sub>GS</sub> <V <sub>th</sub>			60	A
ISP	Pulsed source current				180	
VSD	Diode forward voltage	I <sub>S</sub> =20 A, V <sub>GS</sub> =0 V			1.3	V
trr	Reverse recovery time	I <sub>S</sub> =10 A, di/dt=100 A/μs		41.8		ns
Q <sub>rr</sub>	Reverse recovery charge			36.1		nC
I <sub>rrm</sub>	Peak reverse recovery current			1.4		A

### Note

1. Calculated continuous current based on maximum allowable junction temperature.
2. Repetitive rating; pulse width limited by max. junction temperature.
3. Pd is based on max. junction temperature, using junction-case thermal resistance.
4. V<sub>DD</sub>=50 V, R<sub>G</sub>=50 Ω, L=0.3 mH, starting T<sub>J</sub>=25 °C.
5. The value of R<sub>θJA</sub> is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>a</sub>=25 °C.

Typical Characteristics

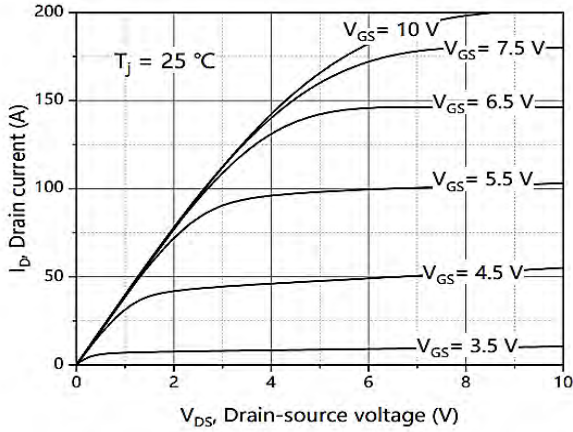


Figure 1. Typ. output characteristics

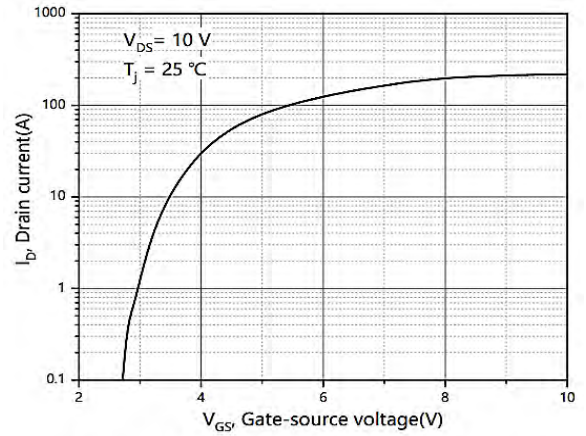


Figure 2. Typ. transfer characteristics

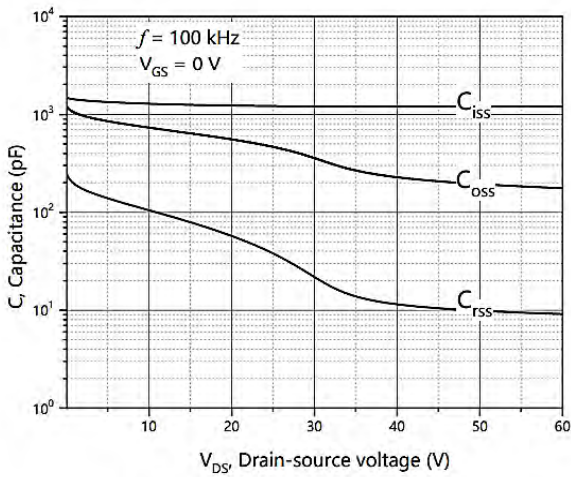


Figure 3. Typ. capacitances

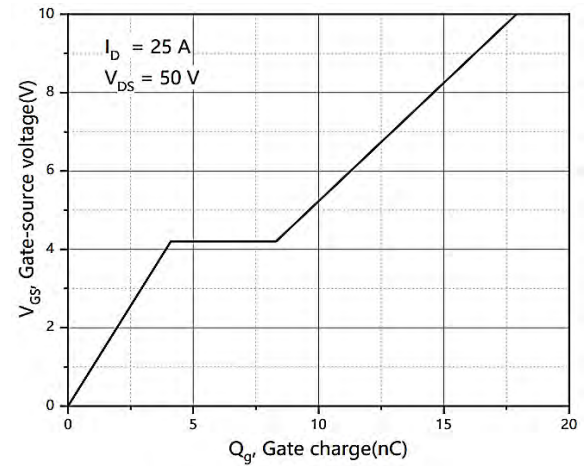


Figure 4. Typ. gate charge

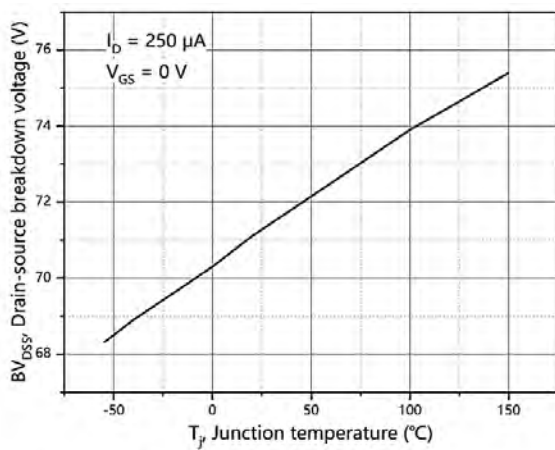


Figure 5. Drain-source breakdown voltage

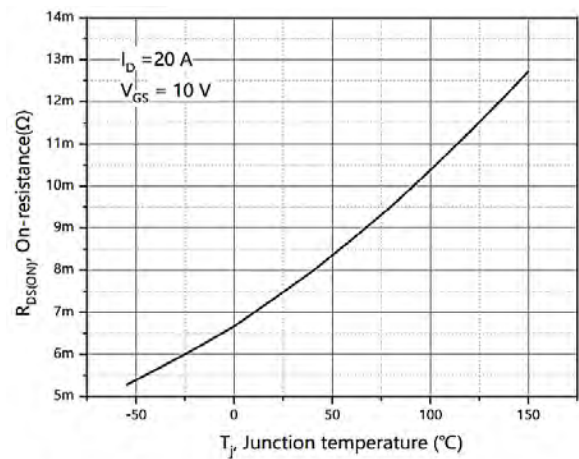


Figure 6. Drain-source on-state resistance

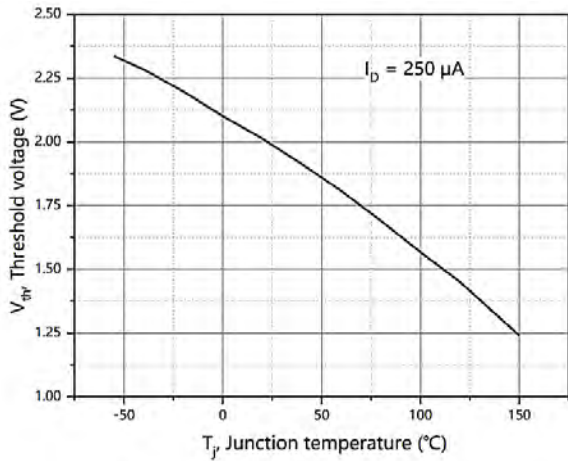


Figure 7. Threshold voltage

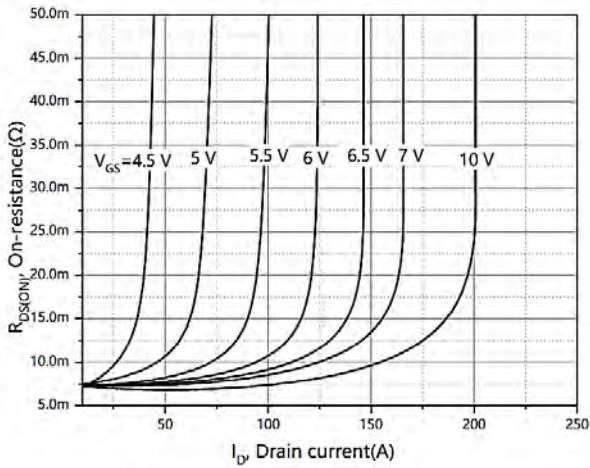


Figure 9. Drain-source on-state resistance

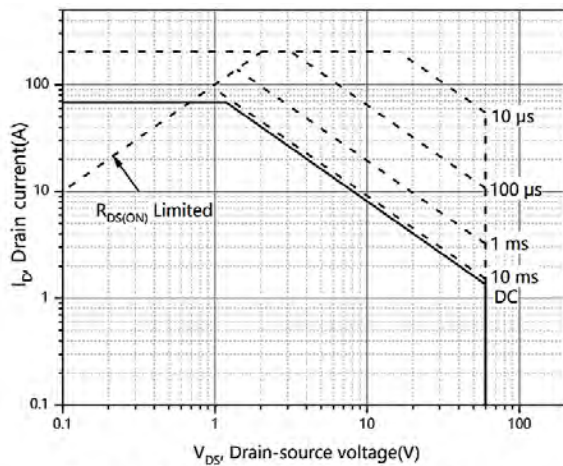


Figure 11. Safe operation area  $T_C=25\text{ }^\circ\text{C}$

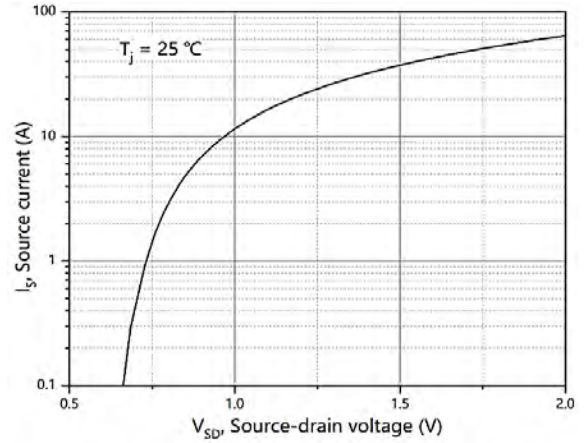


Figure 8. Forward characteristic of body diode

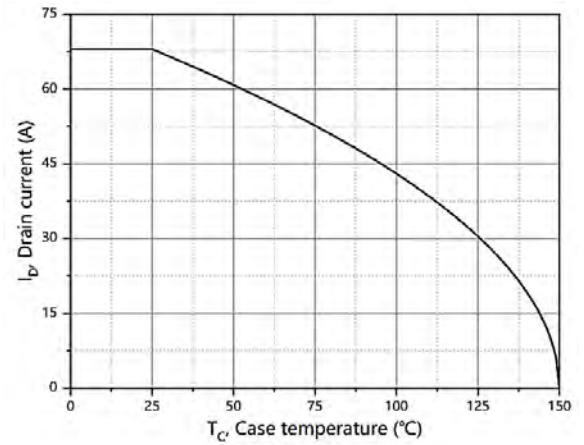


Figure 10. Drain current

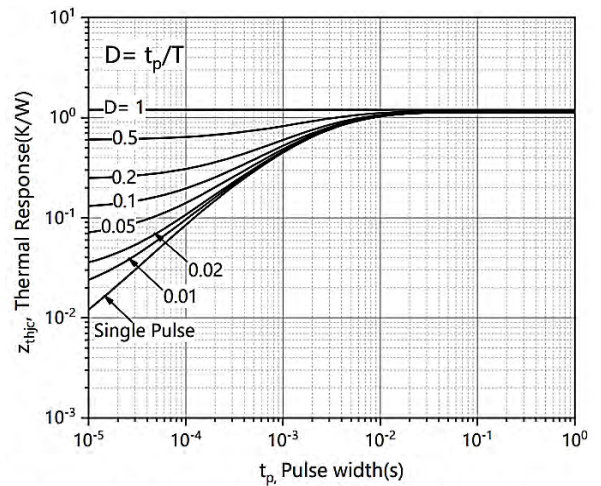
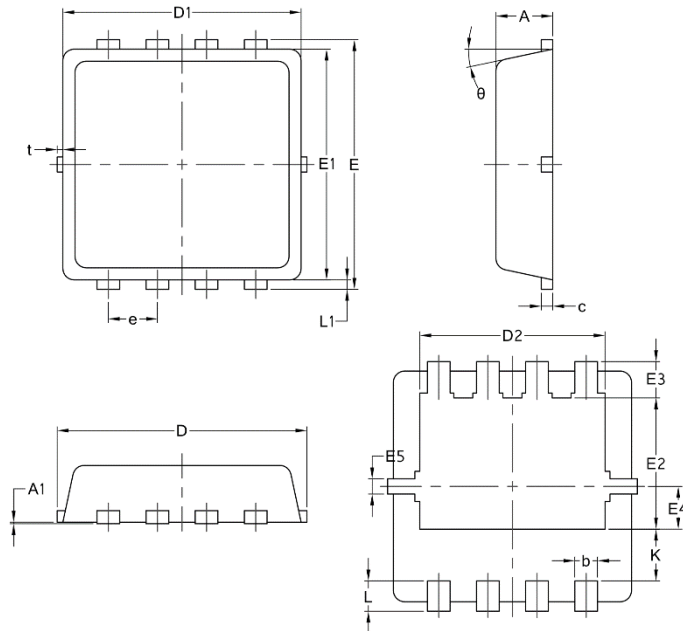


Figure 12. Max. transient thermal impedance

## Package Mechanical Data-DFN3\*3-8L Single



Symbol	Common		
	mm		
	Mim	Nom	Max
A	0.70	0.75	0.85
A1	/	/	0.05
b	0.20	0.30	0.40
c	0.10	0.152	0.25
D	3.15	3.30	3.45
D1	3.00	3.15	3.25
D2	2.29	2.45	2.65
E	3.15	3.30	3.45
E1	2.90	3.05	3.20
E2	1.54	1.74	1.94
E3	0.28	0.48	0.65
E4	0.37	0.57	0.77
E5	0.10	0.20	0.30
e	0.60	0.65	0.70
K	0.59	0.69	0.89
L	0.30	0.40	0.50
L1	0.06	0.125	0.20
t	0	0.075	0.13
$\Phi$	10	12	14