

N-Channel Power MOSFET

General Description

- Very low on-resistance $R_{DS(ON)}$
- Low Gate Charge
- Excellent Gate Charge x $R_{DS(ON)}$ Product

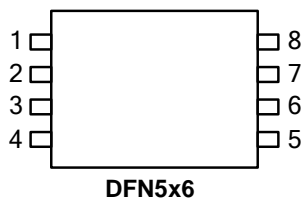
Applications

- High Frequency Switching and Synchronous Rectification

Product Summary

V_{DS}	100V
I_D	60A
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 11.5mΩ (Max)
$R_{DS(ON)}$ (at $V_{GS}=4.5V$)	< 15 mΩ (Max)

100% DVDS Tested
 100% UIS Tested
 100% Rg Tested



Part Number	Package Type	Form	Marking
SL60N10Q	DFN5x6	Tape & Reel	SL60N10Q

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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	Silicon Limited	60
		$T_C = 100^\circ C$ ^B	39
Pulsed Drain Current ^A	I_{DM}	160	A
Avalanche Current ^A	I_{AS}	15	A
Single Pulse Avalanche Energy	E_{AS}	33	mJ
Power Dissipation ^C	P_D	$T_C = 25^\circ C$	56.5
		$T_A = 25^\circ C$	2.5
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Maximum	Units
Maximum Junction-to-Case	$R_{\theta JC}$	50	$^\circ C/W$
Maximum Junction-to-Ambient	$R_{\theta JA}$	2.2	

Electrical Characteristics @ $T_j=25^{\circ}\text{C}$ (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=10mA$	100	-	-	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V, I_D=20A$	-	8	11.5	$m\Omega$
		$V_{GS}=4.5V, I_D=20A$	-	11.6	15	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	-	2.4	V
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=20A$	-	-	-	S
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=20V, V_{GS}=0V$	-	-	1	μA
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Q_g	Total Gate Charge	$I_D=20A$	-	29	-	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=15V$	-	14	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=4.5V$	-	10	-	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=15V$	-	8	-	ns
t_r	Rise Time	$I_D=1A$	-	4	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega$	-	28	-	ns
t_f	Fall Time	$V_{GS}=10V$	-	6	-	ns
C_{iss}	Input Capacitance	$V_{GS}=0V$	-	2550	-	pF
C_{oss}	Output Capacitance	$V_{DS}=15V$	-	305	-	pF
C_{rss}	Reverse Transfer Capacitance	$f=1.0MHz$	-	12	-	pF
R_g	Gate Resistance	$f=1.0MHz$	-	1.6	-	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage ²	$I_S=20A, V_{GS}=0V$	-	-	1.2	V
t_{rr}	Reverse Recovery Time	$I_S=20A, V_{GS}=0V,$	-	45	-	ns
Q_{rr}	Reverse Recovery Charge	$di/dt=100A/\mu s$	-	30	-	nC

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is $V_{DS}=25V, V_{GS}=10V, L=0.3mH, I_{AS}=15A$
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

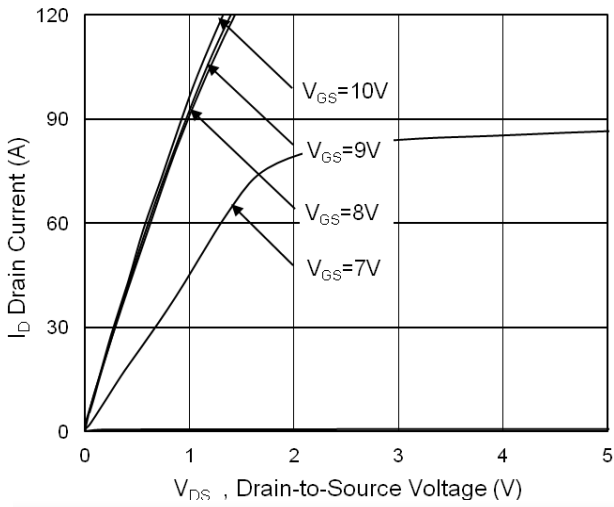


Fig.1 Typical Output Characteristics

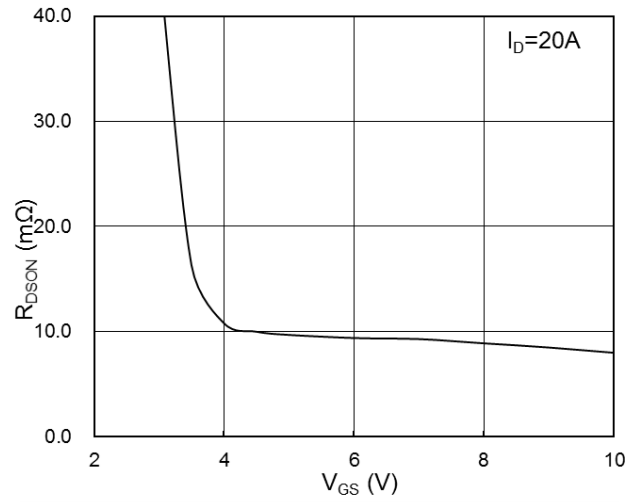


Fig.2 On-Resistance vs G-S Voltage

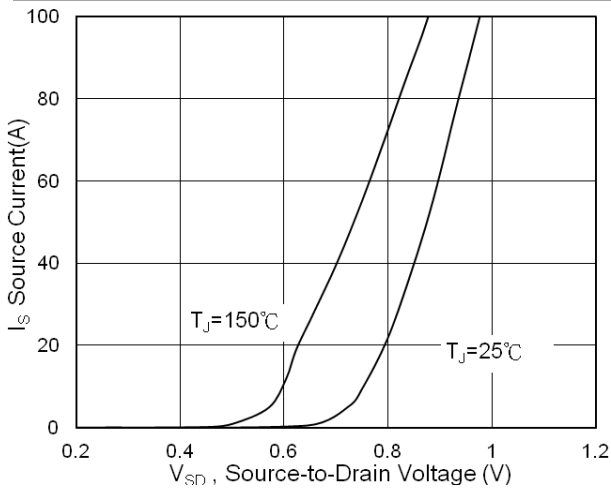


Fig.3 Source Drain Forward Characteristics

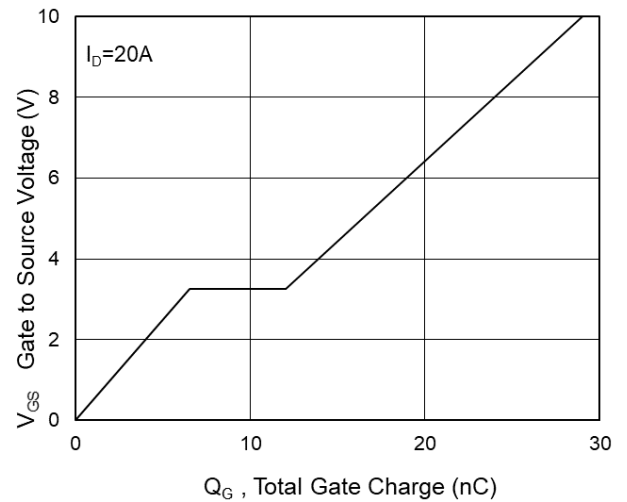


Fig.4 Gate-Charge Characteristics

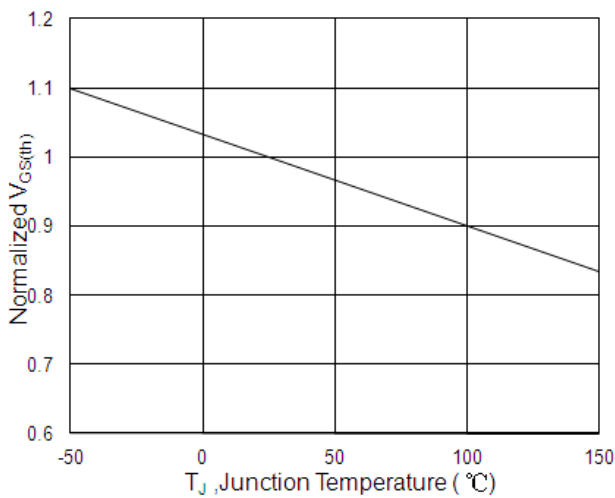


Fig.5 Normalized $V_{GS(th)}$ vs T_J

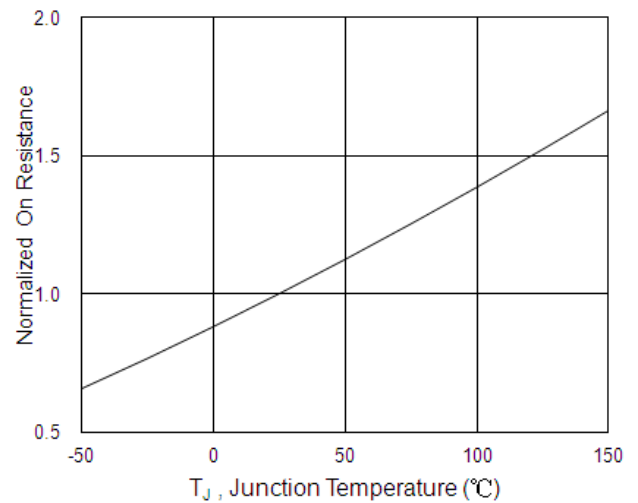


Fig.6 Normalized $R_{DS(on)}$ vs T_J

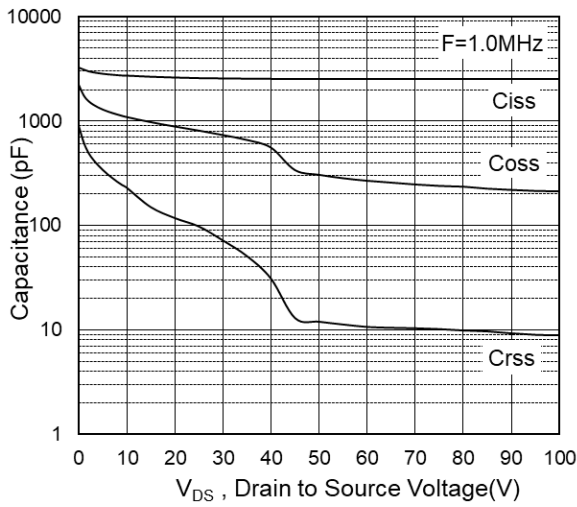


Fig.7 Capacitance

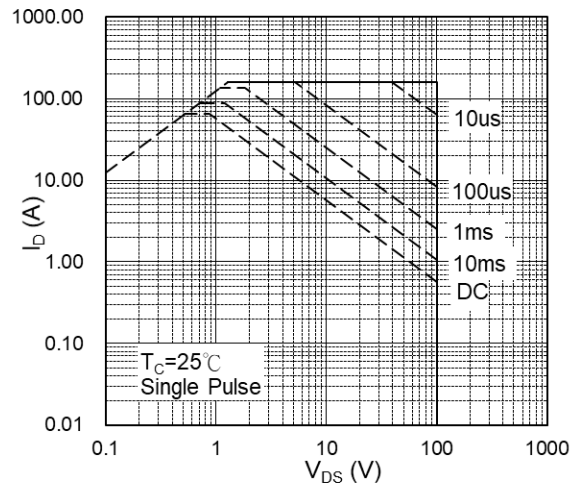


Fig.8 Safe Operating Area

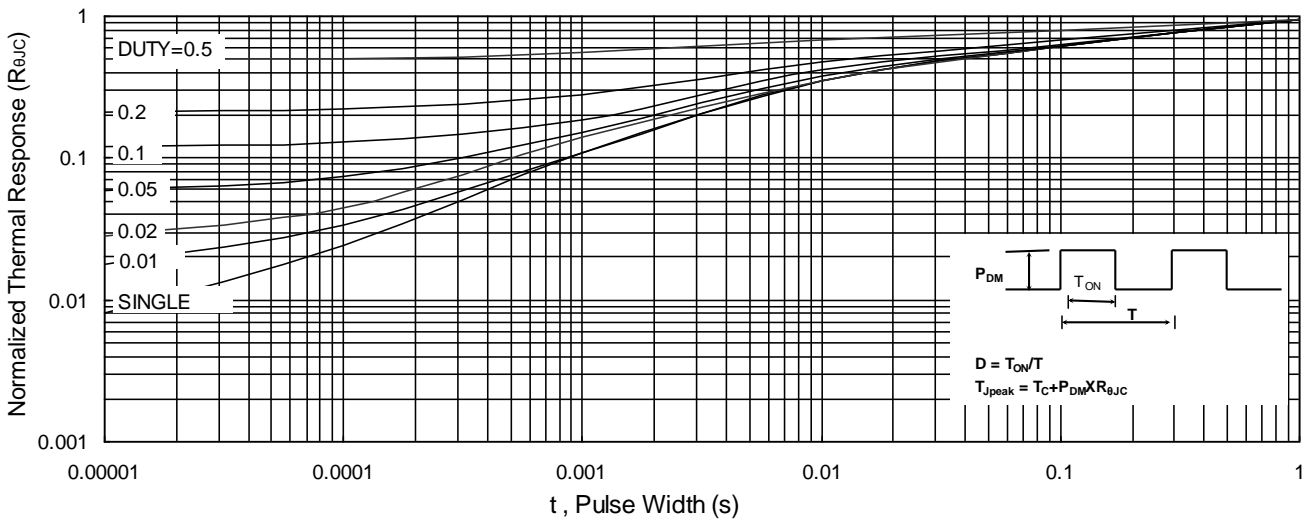


Fig.9 Normalized Maximum Transient Thermal Impedance

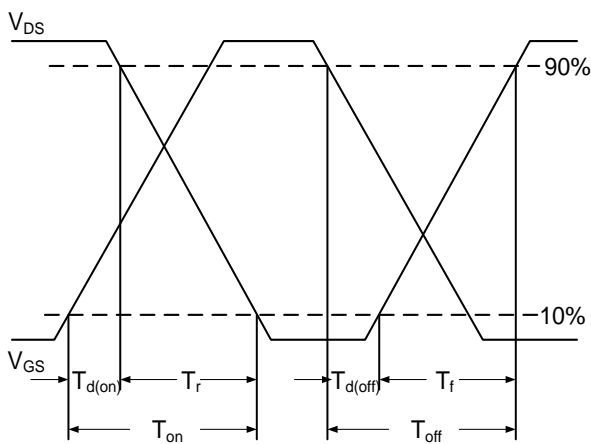


Fig.10 Switching Time Waveform

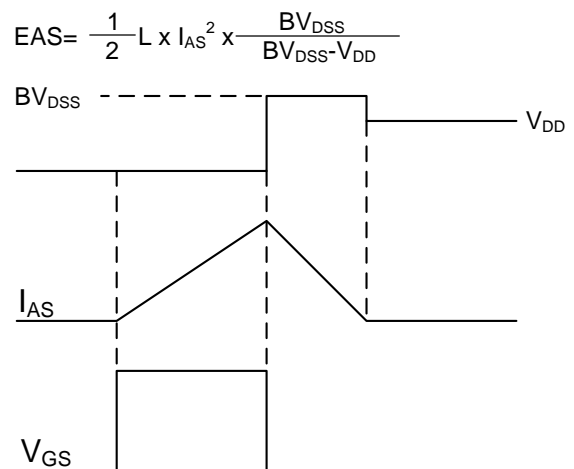
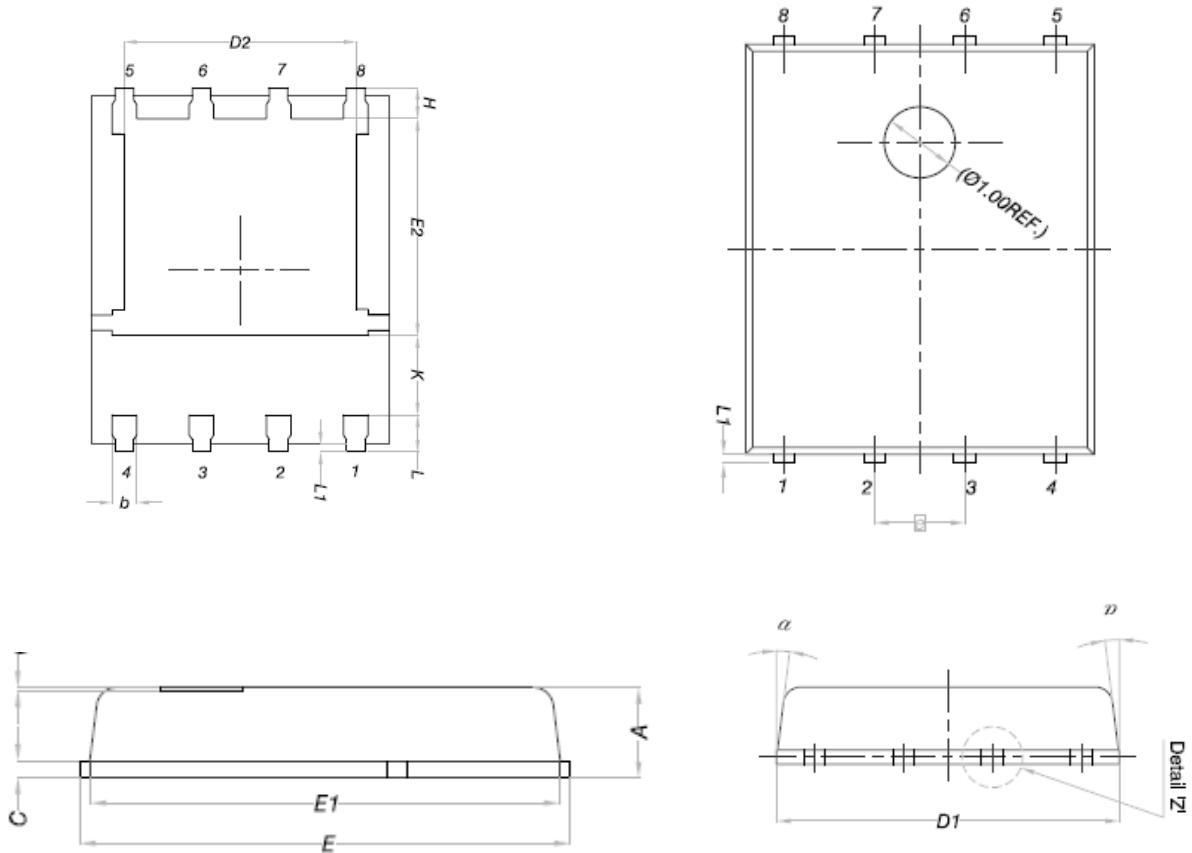


Fig.11 Unclamped Inductive Switching Waveform

DFN5x6


DIM.	MILLIMETERS			DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.		MIN.	NOM.	MAX.
A	0.90	1.00	1.10	E	5.90	6.00	6.10
A1	0	-	0.05	E1	5.70	5.75	5.80
b	0.33	0.41	0.51	E2	3.38	3.58	3.78
C	0.20	0.25	0.30	e	1.27 BSC		
D1	4.80	4.90	5.00	H	0.41	0.51	0.61
D2	3.61	3.81	3.96	K	1.10	-	-
				L	0.51	0.61	0.71
				L1	0.06	0.13	0.20
				alpha	0°	-	12°