40V N-Channel Power MOSFET

DESCRIPTION：

·Fast switching speed

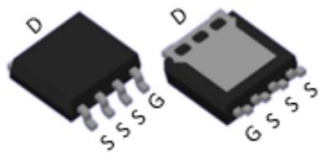
·Reliable and Rugged

·ROHS Compliant & Halogen-Free

·100% UIS and Rg Tested

·Moisture Sensitivity Level MSL1

V_{DSS}	40V
I_D	120A
$R_{DS(ON)_MAX}$ @V_{GS}=10V	2.4mΩ



LFPAK56

TYPICAL APPLICATIONS：

·DC-to-DC converters

·Switch Mode Power Supply

·Brushless DC motor control

MAXIMUM RATINGS (at T_C = 25 °C, unless otherwise specified)

Characteristic	Condition	Symbol	Value	Unit
Drain - Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±20	V
Diode Continuous Forward Current		I_S	41	A
Diode Pulse Current		I_{SP}	400	A
Pulsed Drain Current (1)		I_{DM}	299	A
Continuous Drain Current	Tc=25℃ Tc=100℃ Ta=25℃ Ta=70℃	I_D	120 85 26 22	A
Power dissipation	Tc=25℃ Tc=100℃ Ta=25℃ Ta=70℃	P_D	62.5 31.25 3.0 2.1	W
Single Pulse Avalanche Current (2)	L= 0.1mH L= 0.5mH	I_{AS}	32 18	A
Single Pulsed Avalanche Energy (3)	L= 0.1mH L= 0.5mH	E_{AS}	51 81	mJ
Maximum Junction Temperature		T_J	175	℃
Storage temperature Range		T_J, T_{STG}	-55~+175	℃

Notes： 1. Max. current is limited by junction temperature.

2. UIS tested and pulse width are limited by maximum junction temperature 175°C.

3. Surface Mounted on 1in2 FR-4 board with 1oz.

THERMAL CHARACTERISTICS

Characteristic	Condition	Symbol	Value	Unit
Thermal resistance,	Junction to Ambient Junction to Case	$R_{\theta JA}$ $R_{\theta JC}$	50 2.4	℃/W

ELECTRICAL CHARATERISTICS (at T_J = 25 °C, unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage VGS = 0V, ID = 250uA	BV_{DSS}	40			V
Zero Gate Voltage Drain Current VDS = 32 V, VGS = 0 V	I_{DSS}			1	uA
Gate-Source Leakage Current VGS = ±20V, VDS = 0V	I_{GSS}			±100	nA
Gate-Source threshold voltage VDS = VGS, ID = 250uA	$V_{GS(th)}$	2	3	4	V
Drain-Source On-State Resistance VGS = 10V, ID = 40A	$R_{DS(on)}$		2	2.4	mΩ
Forward Transconductance VDS = 5.0V, ID = 10A	gfs		46		S
Gate Resistance f=1MHz	Rg		1.1		Ω
Input capacitance f=1MHz, VDS=20 V, VGS=0 V	C_{iss}		2163		pF
Output capacitance f=1MHz, VDS=20 V, VGS=0 V	C_{oss}		690		pF
Reverse transfer capacitance f=1MHz, VDS=20 V, VGS=0 V	C_{rss}		57		pF
Turn-on delay time VDS=20 V, ID=1A, VGS=10V, R_{GEN}=1Ω	td (ON)		14		ns
Rise time VDS=20 V, ID=1A, VGS=10V, R_{GEN}=1Ω	tr		10		ns
Turn-off delay time VDS=20 V, ID=1A, VGS=10V, R_{GEN}=1Ω	td (OFF)		26		ns
Fall time VDS=20 V, ID=1A, VGS=10V, R_{GEN}=1Ω	tf		49		ns
Total Gate Charge VDS= 20V, ID= 20A, VGS= 10V	Q_G		30		nC
Gate to Source Charge VDS= 20V, ID= 20A, VGS= 10V	Q_{GS}		10		nC
Gate to Drain Charge VDS= 20V, ID= 20A, VGS= 10V	Q_{GD}		5		nC
Diode Forward Voltage VGS = 0V, I_{SD} =25A	V_{SD}		0.8	1.1	V
Revers Recovery Time I_F =10A, VR=20V ,di_F/dt = 100A/us	Trr		32		ns
Revers Recovery Charge I_F =10A, VR=20V ,di_F/dt = 100A/us	Qrr		22		uC

Typical Performance Characteristics

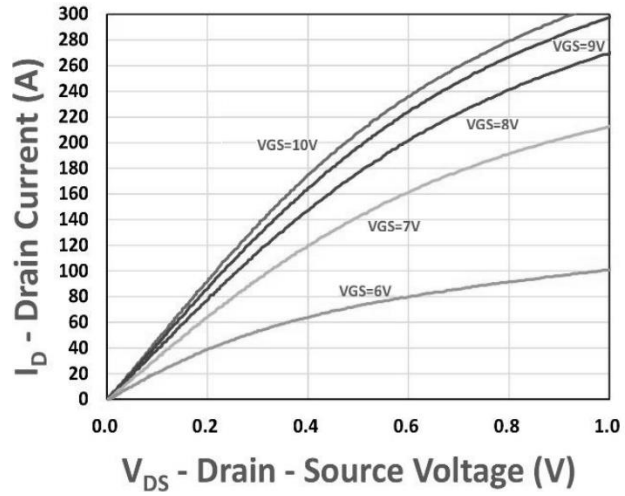


Figure 1. Output Characteristics

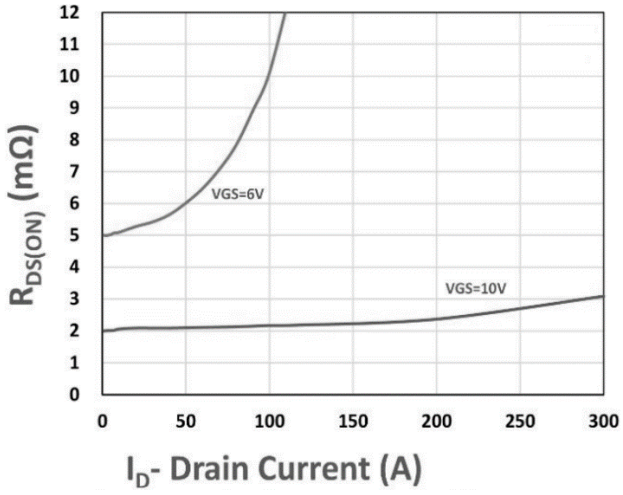


Figure 2. On-Resistance vs. ID

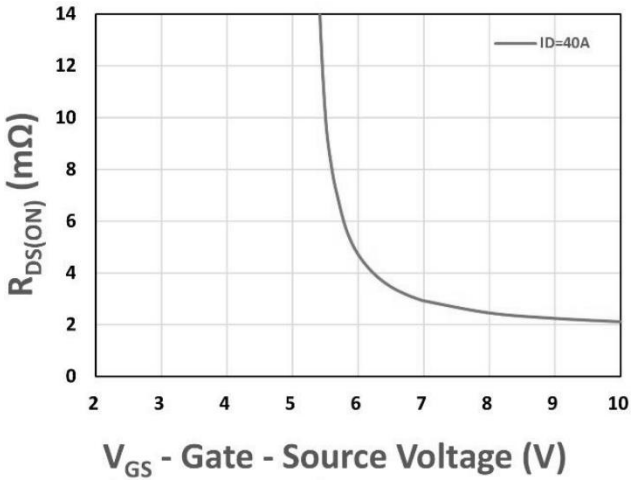


Figure 3. On-Resistance vs. VGS

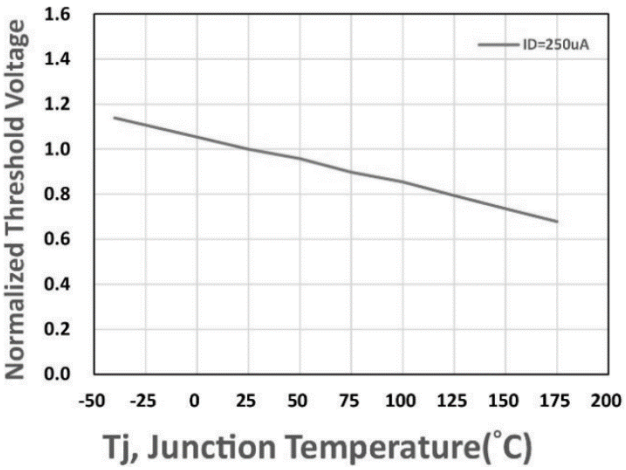


Figure 4. Gate Threshold Voltage

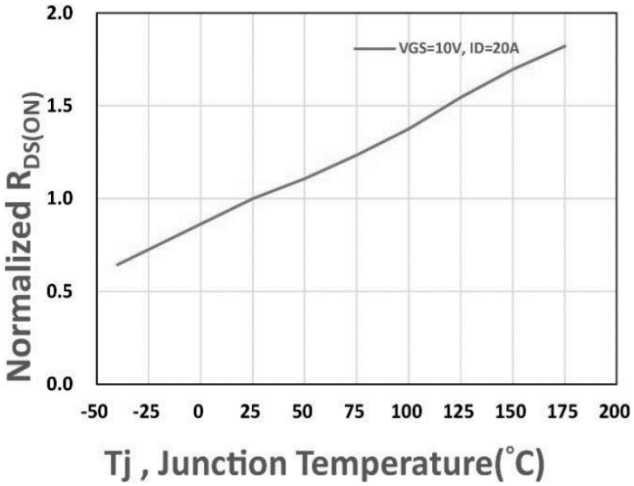


Figure 5. Drain-Source On Resistance

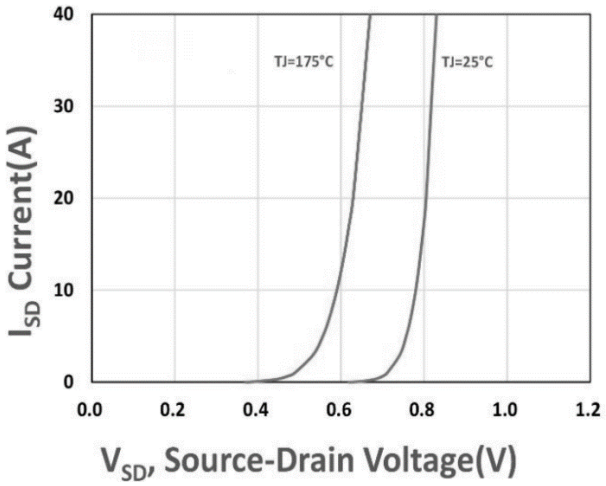


Figure 6. Source-Drain Diode Forward

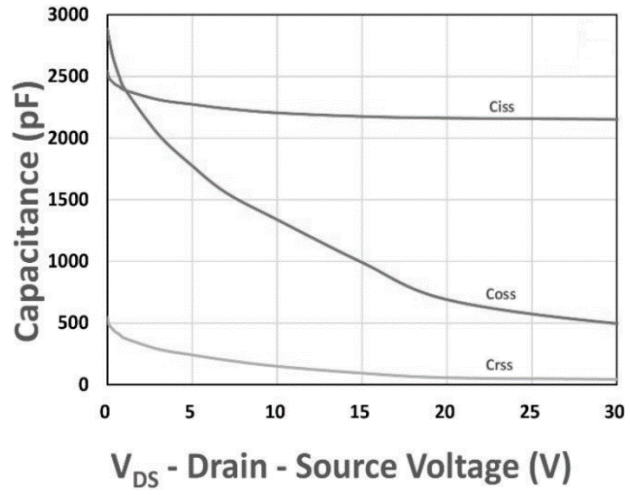


Figure 7. Capacitance

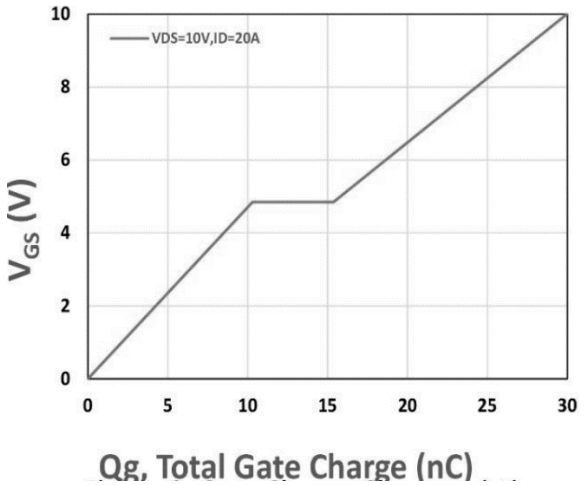


Figure8. Gate Charge Characteristics

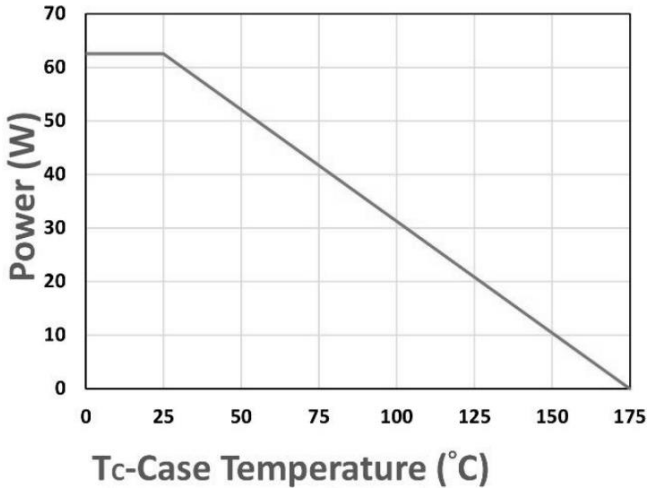


Figure 9. Power Dissipation

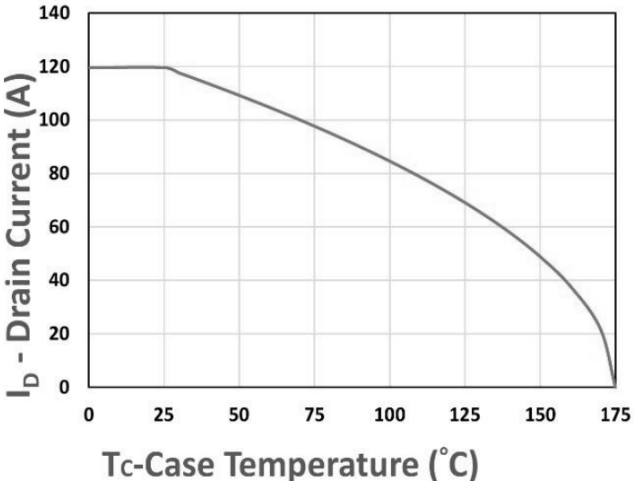


Figure 10. Drain Current

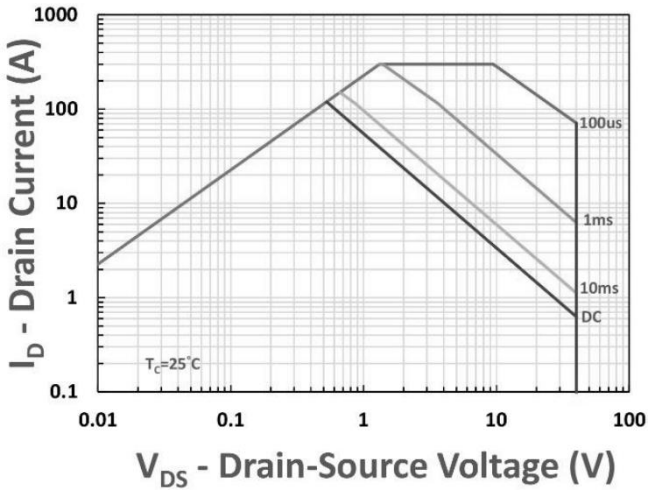


Figure 11. Safe Operating Area

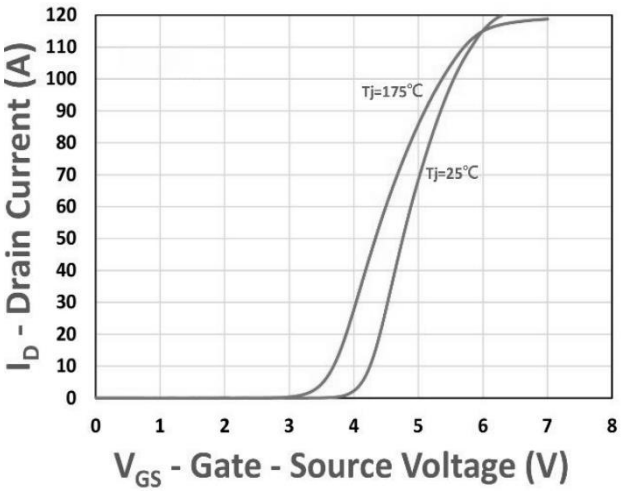


Figure 12. Transfer Characteristics

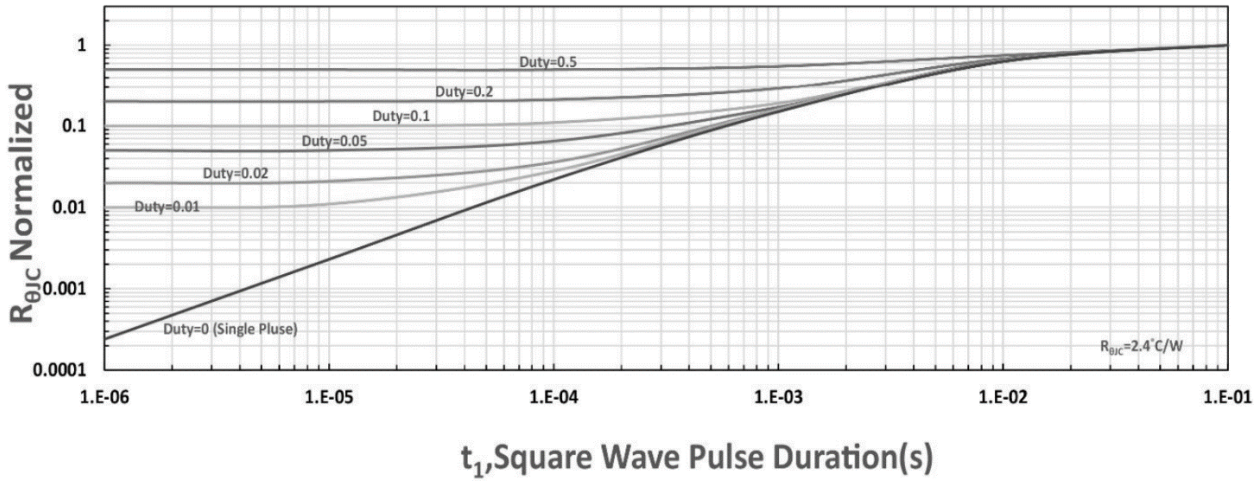
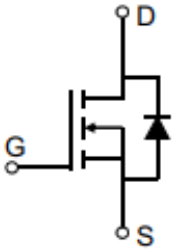
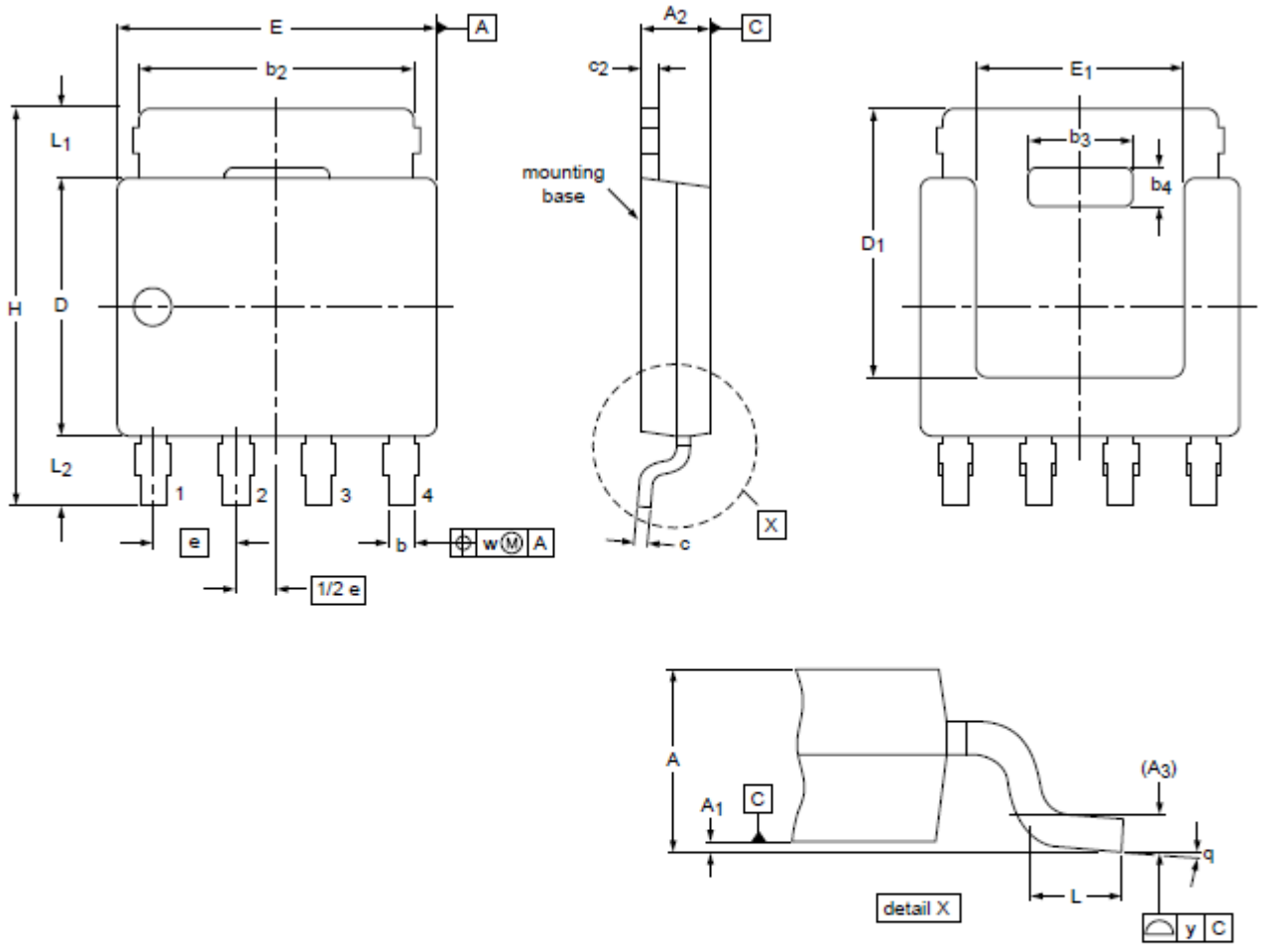


Figure 13. $R_{\theta JC}$ Transient Thermal Impedance

·Circuit diagram



·Package outlines : Dimensions in (mm)



θ
8°
0°

Dimensions (mm are the original dimensions)

Unit(1)		A	A_1	A_2	A_3	b	b_2	b_3	b_4	c	c_2	D(1)	D_1(1)	E(1)	E_1(1)	e	H	L	L_1	L_2	w	y
mm	max	1.20	0.15	1.10		0.50	4.41	2.2	0.9	0.25	0.30	4.10	4.20	5.0	3.3		6.2	0.85	1.3	1.3		
	nom				0.25											1.27					0.25	0.1
	min	1.01	0.00	0.95		0.35	3.62	2.0	0.7	0.19	0.24	3.80		4.8	3.1		5.8	0.40	0.8	0.8		

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