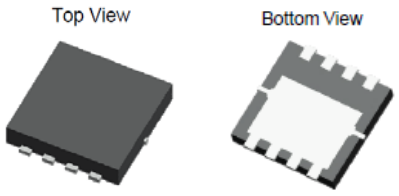
60V N-Channel Power MOSFET

V_{DSS}	60V
I_D	59A
$R_{DS(ON)_MAX}$ @V_{GS}=10V	5.0mΩ

DESCRIPTION：

- Ultra-low $R_{DS(ON)}$
- Low Gate Charge
- 100% UIS Tested, 100% Rg Tested
- Halogen-free and RoHS compliant
- Pb-Free Lead Plating
- AEC-Q101 Qualified for Automotive Applications



PDFN3×3-8L

3MAXIMUM RATINGS (at T_A = 25 °C, unless otherwise specified)

Characteristic	Condition	Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	Tc=25℃ Tc=100℃	I_D	59 38	A
Pulsed Drain Current (1)		I_{DM}	201	A
Avalanche Current (2)		I_{AS}	25	A
Avalanche Energy (2)		E_{AS}	94	mJ
Power dissipation	Tc=25℃ Tc=100℃	P_D	39 15.6	W
Junction & Storage temperature Range		T_J, T_{STG}	-55~+150	℃

Notes： 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. This single-pulse measurement was taken under the following condition [L = 100uH, V_{GS} = 10V, V_{DS} = 15V] while its value is limited by T_{J_Max} = 150°C.

THERMAL CHARACTERISTICS

Characteristic	Condition	Symbol	Value	Unit
Thermal resistance,	Junction to Ambient Junction to Case	$R_{\theta JA}$ $R_{\theta JC}$	55 3.2	℃/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	$V_{(BR)DSS}$	60			V
Zero Gate Voltage Drain Current VDS = 48 V, VGS = 0 V (T_J = 25 °C/ T_J = 55 °C)	I_{DSS}			1.0/5.0	uA
Gate-Source Leakage Current VGS = ±20V, VDS = 0V	I_{GSS}			±100	nA
Gate-Source threshold voltage VDS = VGS, ID = 250uA	$V_{GS(th)}$	1.2	1.6	2.5	V
Drain-Source On-State Resistance VGS = 10V, ID = 20A VGS = 4.5V, ID = 15A	$R_{DS(on)}$		5.0 6.0	6.2 7.8	mΩ
Forward Transconductance VDS = 5V, ID = 20A	G_{FS}		85		S
Input capacitance f=1MHz, VDS=30 V, VGS=0 V	C_{iss}		2122		pF
Output capacitance f=1MHz, VDS=30 V, VGS=0 V	C_{oss}		440		pF
Reverse transfer capacitance f=1MHz, VDS=30 V, VGS=0 V	C_{rss}		4.4		pF
Gate Resistance VDS=0 V, VGS= 0V, f=1MHz	R_g		1.8		Ω
Total Gate Charge VDS= 30V, ID= 20A, VGS= 10V VDS= 30V, ID= 20A, VGS= 4.5V	Q_G		32 19.2		nC
Gate to Source Charge VDS= 30V, ID= 20A, VGS=0 to 10V	Q_{GS}		4.8		nC
Gate to Drain Charge VDS= 30V, ID= 20A, VGS=0 to 10V	Q_{GD}		5.4		nC
Turn-on delay time VDS=30 V, VGS= 10V, R_L=1.5Ω, R_{GEN}=6Ω	$td_{(ON)}$		8.0		ns
Rise time VDS=30 V, VGS= 10V, R_L=1.5Ω, R_{GEN}=6Ω	tr		5.1		ns
Turn-off delay time VDS=30 V, VGS= 10V, R_L=1.5Ω, R_{GEN}=6Ω	$td_{(OFF)}$		38		ns
Fall time VDS=30 V, VGS= 10V, R_L=1.5Ω, R_{GEN}=6Ω	tf		14.8		ns

Body Diode

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

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Diode Forward Voltage VGS = 0V, I_S = 1A	V_{SD}		0.70	1.0	V
Diode Continuous Current, Tc=25℃	I_S			30	A
Revers Recovery Time IF=20A, dI_F/dt = 100A/us	Trr		37		ns
Revers Recovery Charge IF=20A, dI_F/dt = 100A/us	Qrr		43		nC

Typical Performance Characteristics

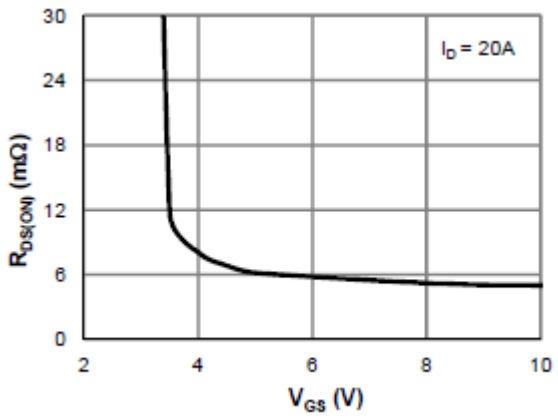


Figure 1. $R_{DS(ON)}$ vs. VGS

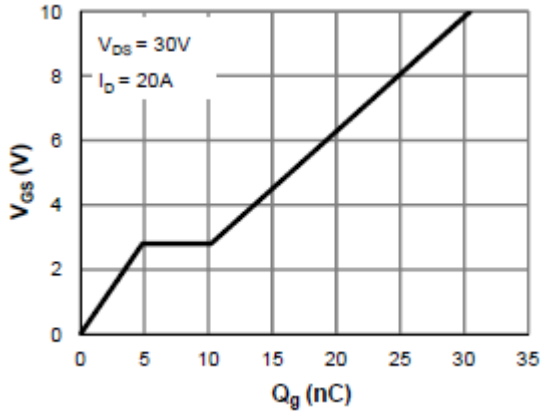


Figure 2. Gate Charge Characteristics

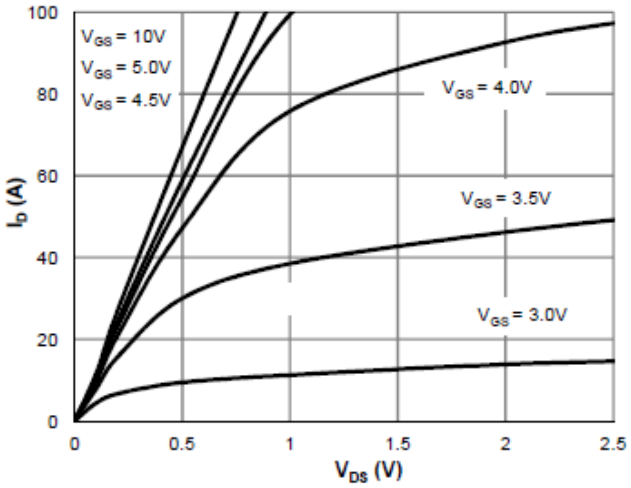


Figure 3. Saturation Characteristics

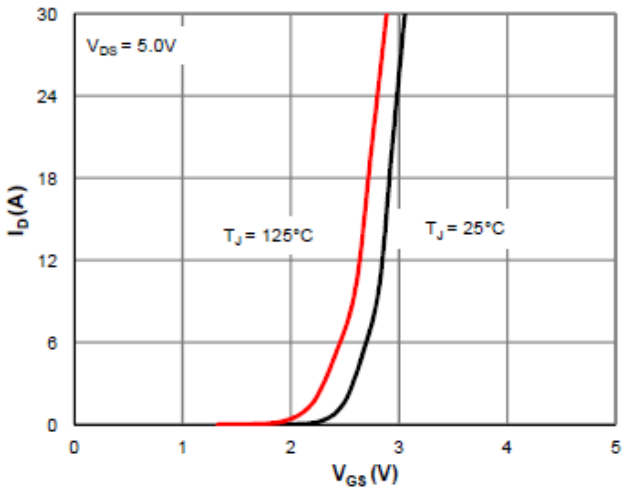


Figure 4. Transfer Characteristics

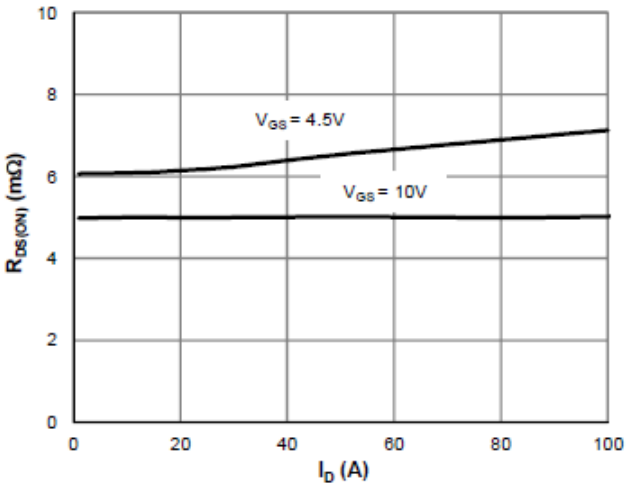


Figure 5. On-resistance vs. Drain Current

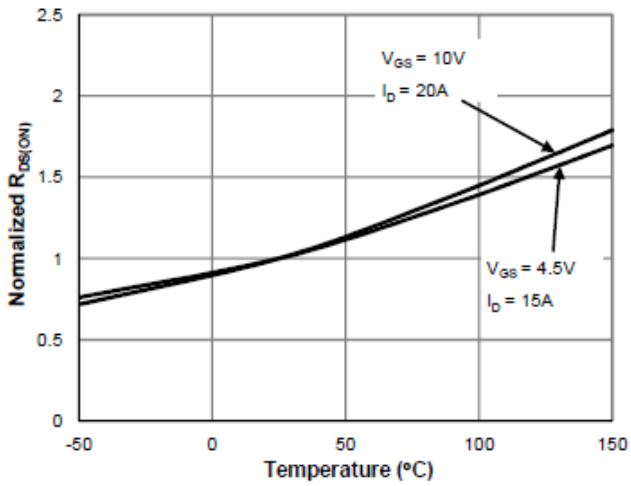


Figure 6. $R_{DS(ON)}$ vs. Junction Temperature

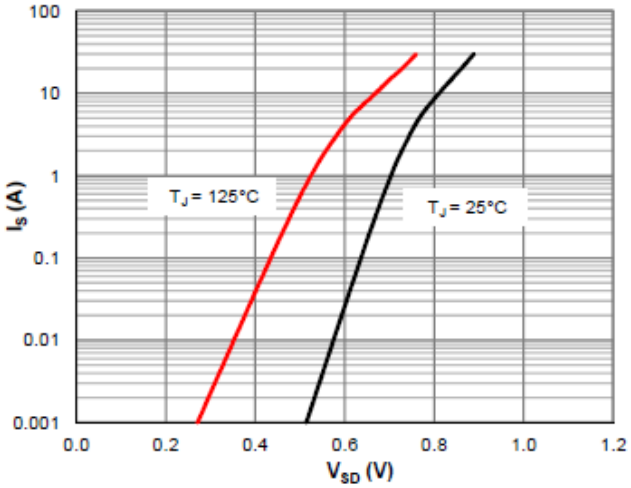


Figure 7. Body-Diode Characteristics

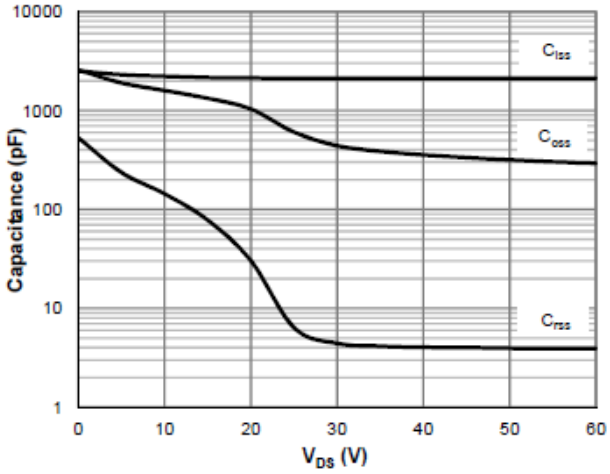


Figure 8. Capacitance Characteristics

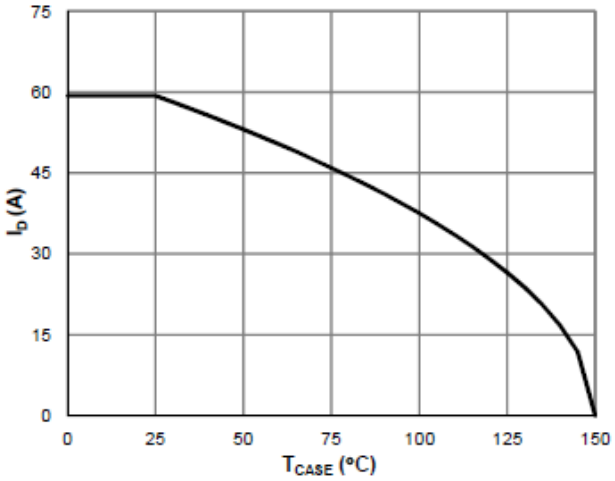


Figure . Current De-rating

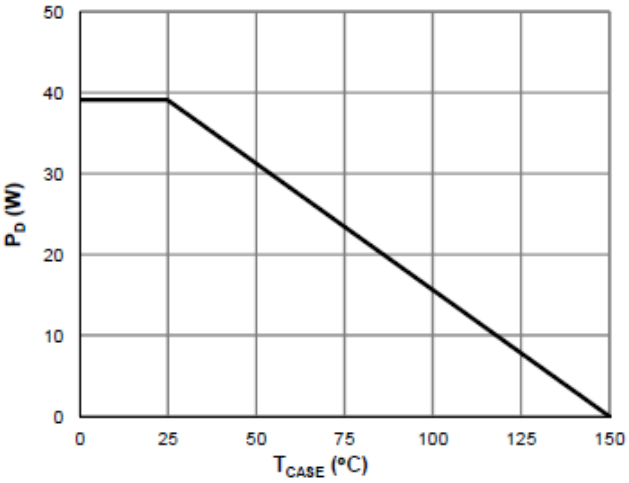


Figure 10. Power De-rating

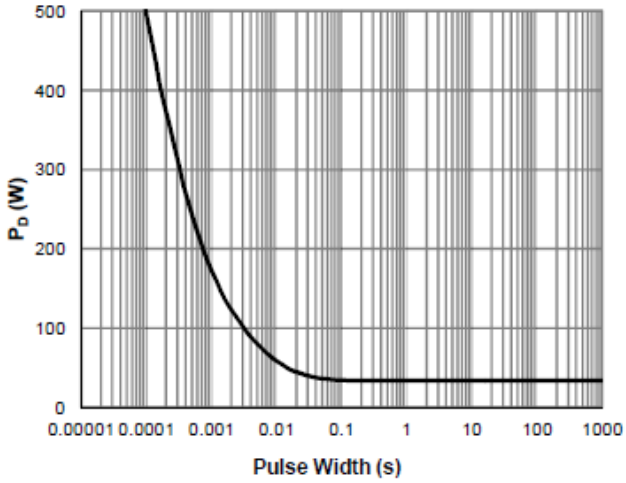


Figure 11. Single Pulse Power Rating, Junction-to-Case

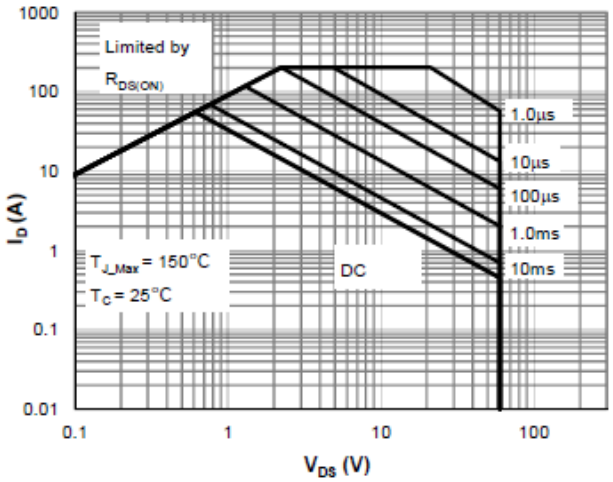


Figure 12. Maximum Safe Operating Area

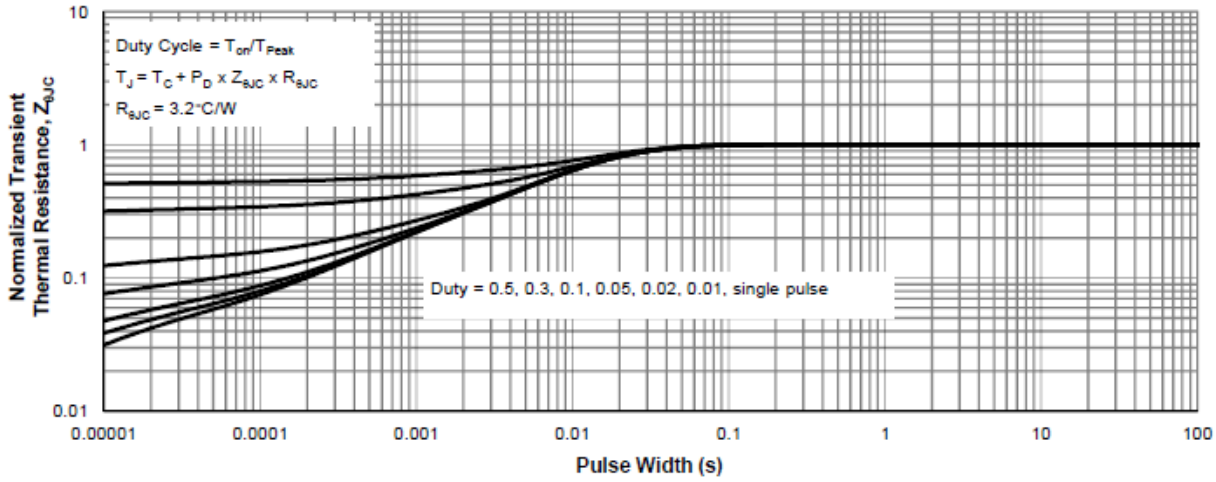
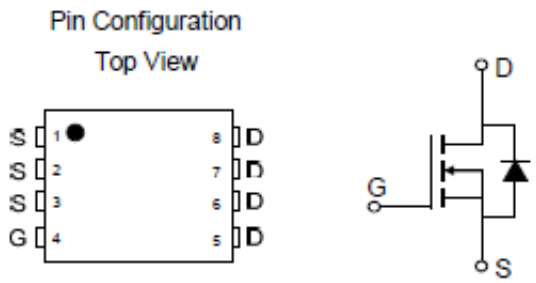


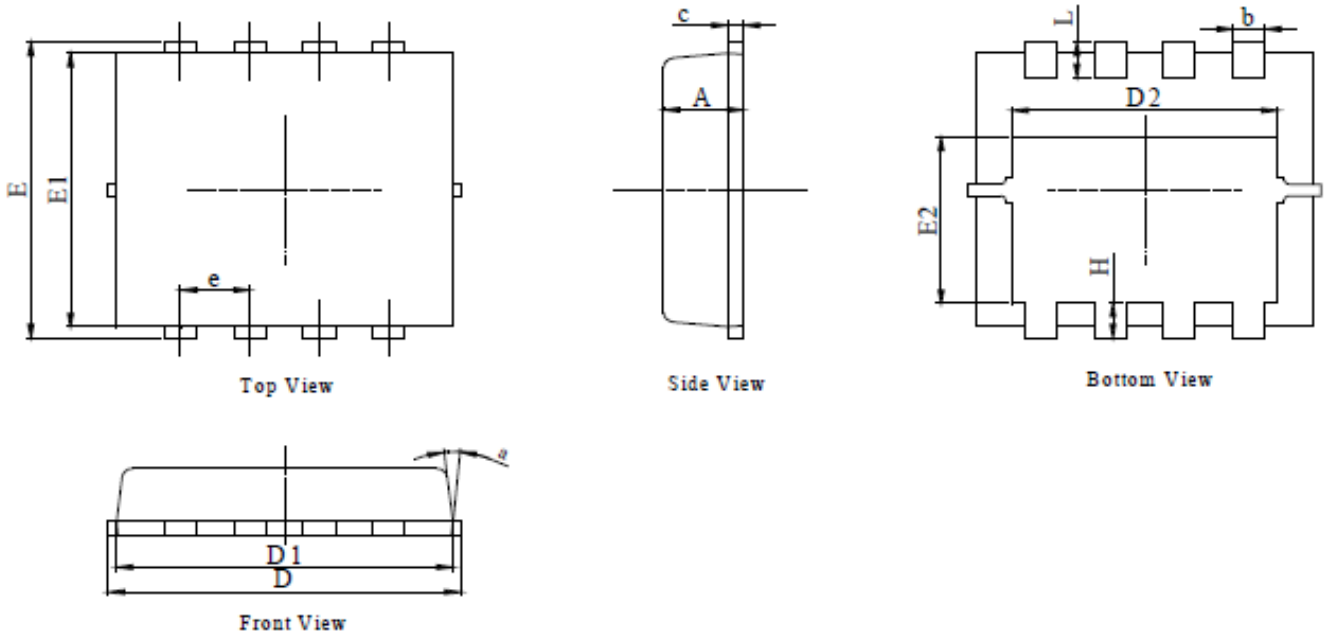
Figure 14. Normalized Maximum Transient Thermal Impedance

- Circuit diagram



- Package outlines : Dimensions in (mm)

Package Outline



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M,1994.
2. ALL DIMNESIONS IN MILLIMETER (ANNGLE IN DEGREE).
3. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.20	0.25
D	3.00	3.15	3.25
D1	2.95	3.05	3.15
D2	2.39	2.49	2.59
E	3.20	3.30	3.40
E1	2.95	3.05	3.15
E2	1.70	1.80	1.90
e	0.65 BSC		
H	0.30	0.40	0.50
L	0.25	0.40	0.50
a	---	---	15°

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