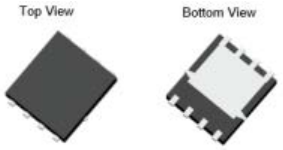
40V, 251A N-Channel Power MOSFET

DESCRIPTION：

- Excellent On-Resistance, $R_{DS(ON)}$
- Low Gate Charge
- 100% UIS Tested, 100% Rg Tested
- Pb-Free Lead Plating
- RoHS compliant

V_{DSS}	40V
I_D @V_{GS}=10V	251A
$R_{DS(ON)\_Typ.}$ @V_{GS}=10V	1.2mΩ



PDFN5x6-8L

TYPICAL APPLICATIONS：

- Power Management
- Load Switch
- PWM Application

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

Characteristic	Condition	Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	Tc=25℃ Tc=100℃	I_D	251 159	A
Pulsed Drain Current (1)		I_{DM}	Refer to Fig4	A
Avalanche Energy (2)		E_{AS}	880	mJ
Power dissipation	Tc=25℃ Tc=100℃	P_D	152 61	W
Junction & Storage temperature Range		T_J, T_{STG}	-55~+150	℃

Notes： 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. E_{AS} condition: Starting T_J=25℃, V_{DD}=20V, V_{GS}=10V, R_G=25ohm, L=3.0mH, I_{AS}=24.22A, V_{DD}=0V during time in avalanche.

THERMAL CHARACTERISTICS

Characteristic	Condition	Symbol	Value	Unit
Thermal resistance,	Junction to Ambient Junction to Case	$R_{\theta JA}$ $R_{\theta JC}$	43 0.8	℃/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	$V_{(BR)DSS}$	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	$V_{GS(th)}$	2.1	3.1	4.0	V
Drain-Source On-State Resistance VGS = 10V, ID = 20A	$R_{DS(on)}$		1.2	1.5	mΩ
Input capacitance f=1MHz, VDS=20 V, VGS=0 V	C_{iss}		6820	10229	pF
Output capacitance f=1MHz, VDS=20 V, VGS=0 V	C_{oss}		3910	5865	pF
Reverse transfer capacitance f=1MHz, VDS=20 V, VGS=0 V	C_{rss}		217	325	pF
Gate Resistance f=1MHz	R_g		1.4		Ω
Total Gate Charge VDS= 20V, ID= 20A,VGS= 0 to 10V	Q_G		99	149	nC
Gate to Source Charge VDS= 20V, ID= 20A,VGS= 0 to 10V	Q_{GS}		30	45	nC
Gate to Drain Charge VDS= 20V, ID= 20A,VGS= 0 to 10V	Q_{GD}		24	37	nC
Turn-on delay time VDD= 20V, VGS= 10V, ID= 20A, R_{GEN}=3Ω	td (ON)		23		ns
Rise time VDD= 20V, VGS= 10V, ID= 20A, R_{GEN}=3Ω	tr		33		ns
Turn-off delay time VDD= 20V, VGS= 10V, ID= 20A, R_{GEN}=3Ω	td (OFF)		54		ns
Fall time VDD= 20V, VGS= 10V, ID= 20A, R_{GEN}=3Ω	tf		25		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 = 20A	V_{SD}			1.2	V
Maximum Continuous Body Diode Forward Current	I_S			251	A
Maximum Pulsed Body Diode Forward Current	I_{SM}			1005	A
Revers Recovery Time IF=20A, di/dt = 100A/us	Trr		76	114	ns
Revers Recovery Charge IF=20A, di/dt = 100A/us	Qrr		144		nC

Typical Performance Characteristics

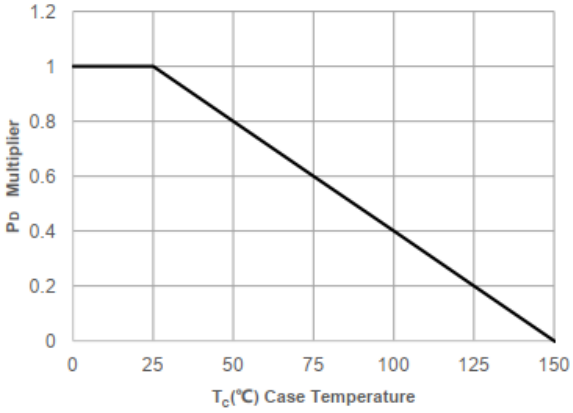


Figure 1. Power De-rating

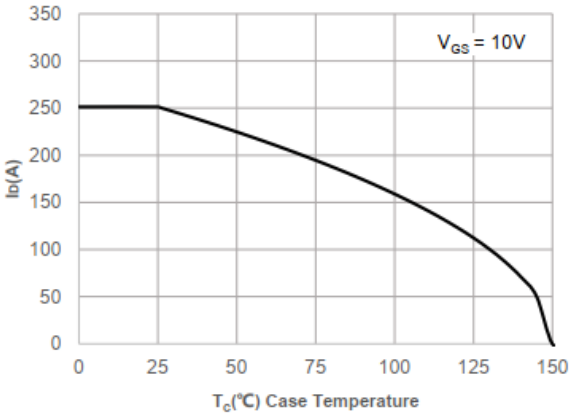


Figure 2. Current De-rating

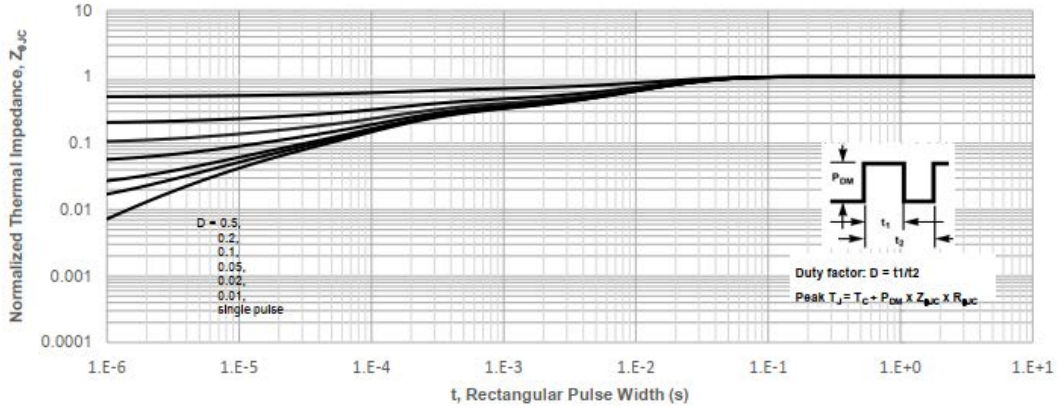


Figure 3. Normalized Maximum Transient Thermal Impedance

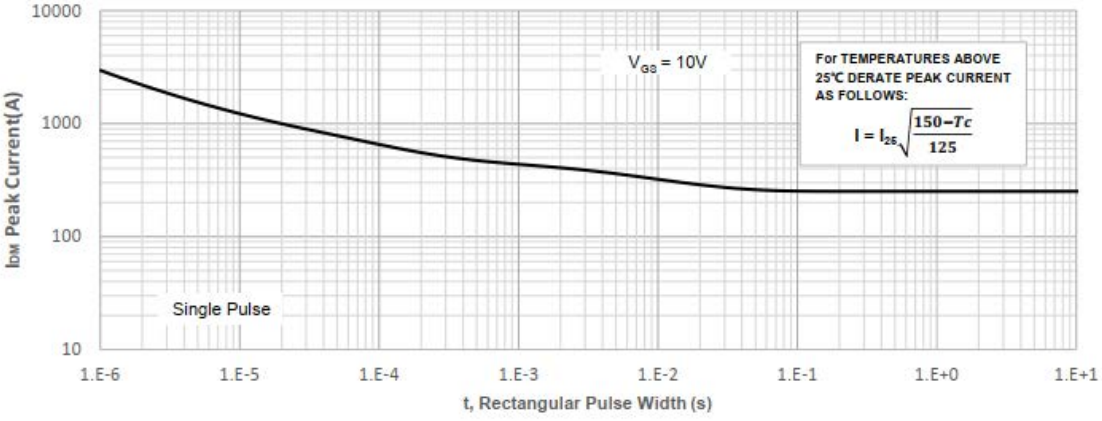


Figure 4. Peak Current Capacity

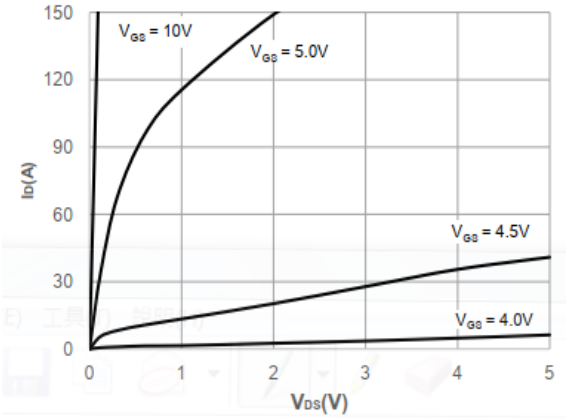


Figure 5. Output Characteristics

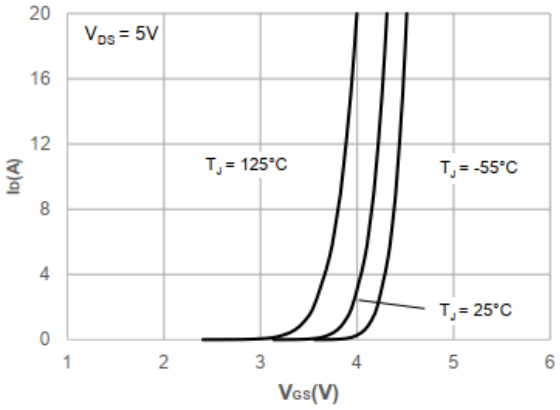


Figure 6. Typical Transfer Characteristics

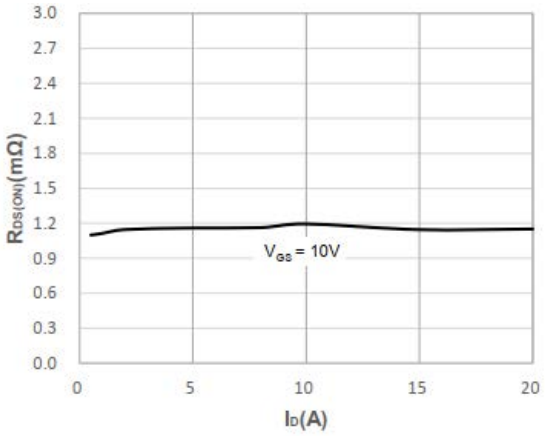


Figure 7. On-resistance vs. Drain Current

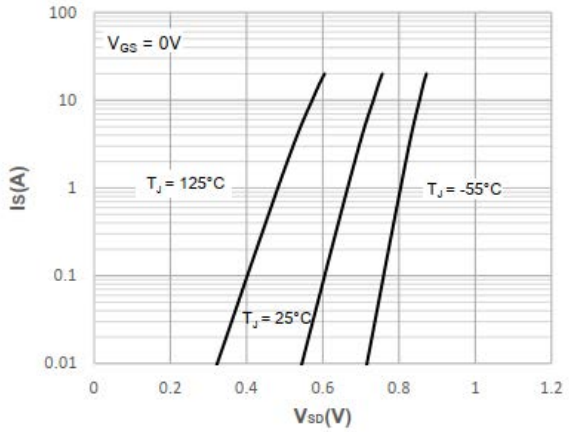


Figure 8. Body Diode Characteristics

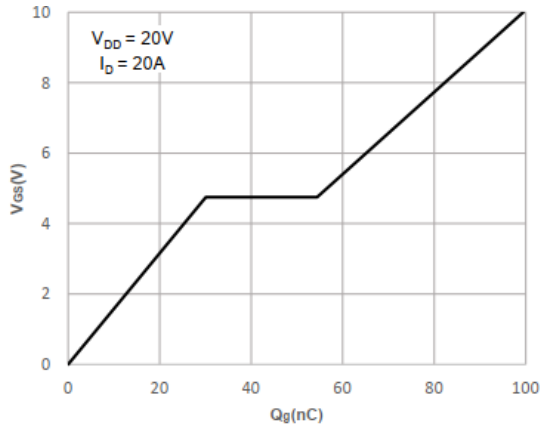


Figure 9. Gate Charge Characteristics

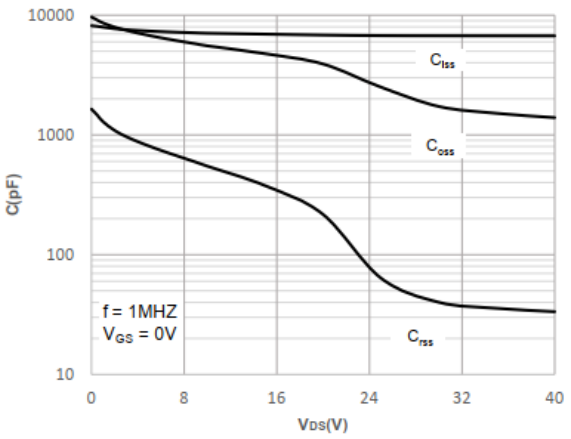


Figure 10. Capacitance Characteristics

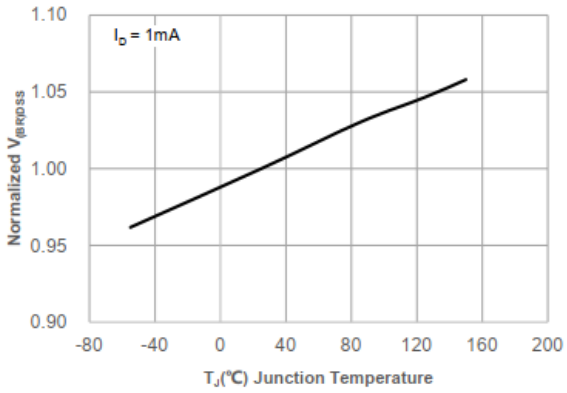


Figure 11. Normalized Breakdown voltage vs. Junction Temperature

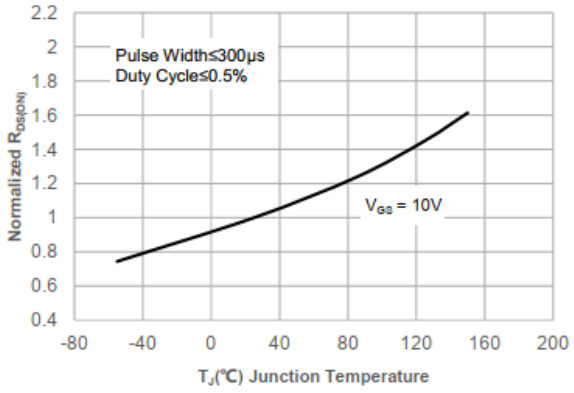


Figure 12. Normalized on Resistance vs. Junction Temperature

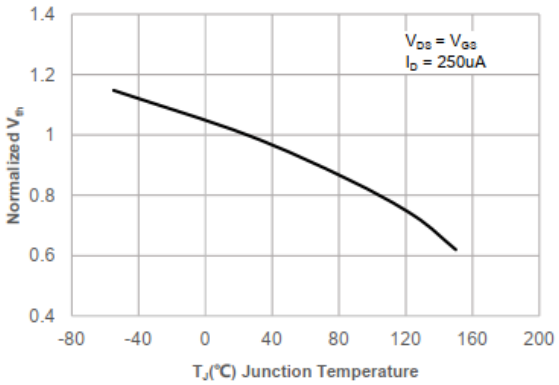


Figure 13. Normalized Threshold Voltage vs. Junction Temperature

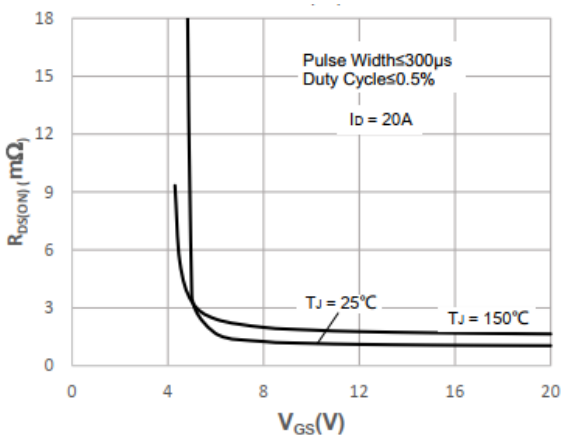


Figure 14. RDS(ON) vs. VGS

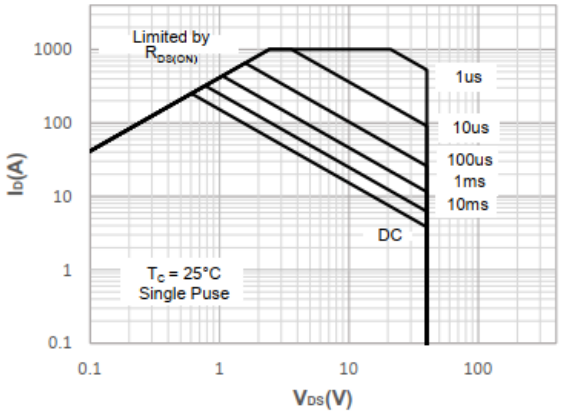
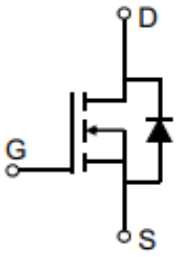
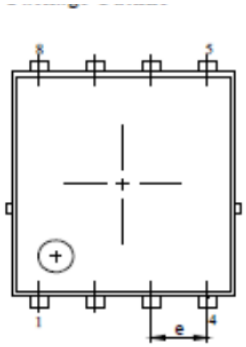


Figure 15. Maximum Safe Operating Area

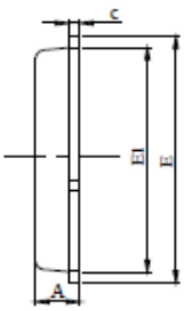
- Circuit diagram



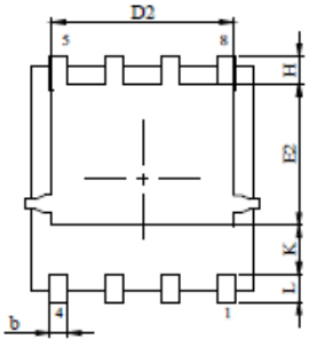
- Package outlines :



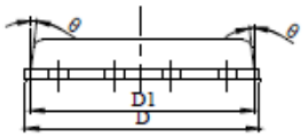
Top View



Side View



Bottom View



Front View

NOTES:
1. Dimension and tolerance per ASME Y14.5M, 1994.
2. All dimensions in millimeter (angle in degree).
3. Dimensions D1 and E1 do not include mold flash protrusions or gate burrs.

DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
b	0.31	0.41	0.51
c	0.20	0.25	0.30
D	5.00	5.20	5.40
D1	4.95	5.05	5.15
D2	4.00	4.10	4.20
E	6.05	6.15	6.25
E1	5.50	5.60	5.70
E2	3.42	3.53	3.63
e		1.27BSC	
H	0.60	0.70	0.80
L	0.50	0.70	0.80
θ	-	-	10°

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