

650V N-Channel Power MOSFET

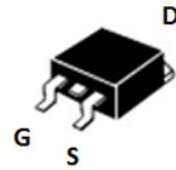
DESCRIPTION :

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

V_{DSS}	650V
$I_D @ V_{GS}=10V$	17A
$R_{DS(ON)_{Typ.}} @ V_{GS}=10V$	156m Ω

TYPICAL APPLICATIONS :

- SMPS with PFC
- Flyback and LLC topologies
- Silver ATX, adapter, TV, lighting, Telecom



TO-263

MAXIMUM RATINGS (at $T_A = 25^\circ\text{C}$, unless otherwise specified)

Characteristic	Condition	Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage		V_{GS}	± 30	V
Continuous Drain Current	$T_c=25^\circ\text{C}$ $T_c=100^\circ\text{C}$	I_D	17 11	A
Pulsed Drain Current ⁽¹⁾		I_{DM}	Refer to Fig.4	A
Avalanche Energy ⁽²⁾		E_{AS}	65	mJ
Power dissipation	$T_c=25^\circ\text{C}$ $T_c=100^\circ\text{C}$	P_D	139 56	W
Junction & Storage temperature Range		T_J, T_{STG}	-55~+150	$^\circ\text{C}$

Notes : 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.

2. E_{AS} condition: Starting $T_J=25^\circ\text{C}$, $V_{DD}=50V$, $V_{GS}=10V$, $R_G=25\text{ohm}$, $L=10\text{mH}$, $I_{AS}=3.6A$, $V_{DD}=0V$ during time in avalanche.

THERMAL CHARACTERISTICS

Characteristic	Condition	Symbol	Value	Unit
Thermal resistance,	Junction to Ambient Junction to Case	$R_{\theta JA}$ $R_{\theta JC}$	33 0.9	$^\circ\text{C}/W$

ELECTRICAL CHARACTERISTICS (at $T_J = 25\text{ }^\circ\text{C}$, unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage VGS = 0V, ID = 250uA	$V_{(BR)DSS}$	650			V
Zero Gate Voltage Drain Current VDS = 650 V, VGS = 0 V	I_{DSS}			10	uA
Gate-Source Leakage Current VGS = ± 30 V, VDS = 0V	I_{GSS}			± 100	nA
Gate-Source threshold voltage VDS = VGS, ID = 250uA	$V_{GS(th)}$	2.3	3.3	4.3	V
Drain-Source On-State Resistance VGS = 10V, ID = 10A	$R_{DS(on)}$		156	190	m Ω
Input capacitance f=1MHz, VDS=325 V, VGS=0 V	C_{iss}		1517	2276	pF
Output capacitance f=1MHz, VDS=325 V, VGS=0 V	C_{oss}		39	58	pF
Reverse transfer capacitance f=1MHz, VDS=325 V, VGS=0 V	C_{rss}		5.9		pF
Gate Resistance VDS=0 V, VGS= 0V, f=1MHz	R_g		4.9		Ω
Total Gate Charge VDS= 325V, ID= 10A,VGS=0 to 10V	Q_G		32	48	nC
Gate to Source Charge VDS= 325V, ID= 10A,VGS=0 to 10V	Q_{GS}		10		nC
Gate to Drain Charge VDS= 325V, ID= 10A,VGS=0 to 10V	Q_{GD}		11		nC
Turn-on delay time VDD=310 V, VGS= 10V, ID= 10A, R _{GEN} =24 Ω	$t_{d(ON)}$		36		ns
Rise time VDD=310 V, VGS= 10V, ID= 10A, R _{GEN} =24 Ω	t_r		38		ns
Turn-off delay time VDD=310 V, VGS= 10V, ID= 10A, R _{GEN} =24 Ω	$t_{d(OFF)}$		100		ns
Fall time VDD=310 V, VGS= 10V, ID= 10A, R _{GEN} =24 Ω	t_f		30		ns

Body Diode

ELECTRICAL CHARACTERISTICS (at $T_J = 25\text{ }^\circ\text{C}$, unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Diode Forward Voltage $V_{GS} = 0V, I_S = 10A$	V_{SD}			1.2	V
Maximum Continuous Body Diode Forward Current	I_S			17	A
Maximum Pulsed Body Diode Forward Current	I_{SM}			67	A
Revers Recovery Time $I_F = 10A, di/dt = 100A/us$	T_{rr}		131	197	ns
Revers Recovery Charge $I_F = 10A, di/dt = 100A/us$	Q_{rr}		851		nC

Typical Performance Characteristics

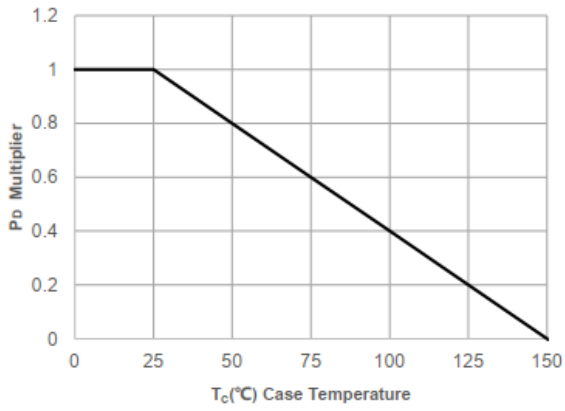


Figure 1. Power De-rating

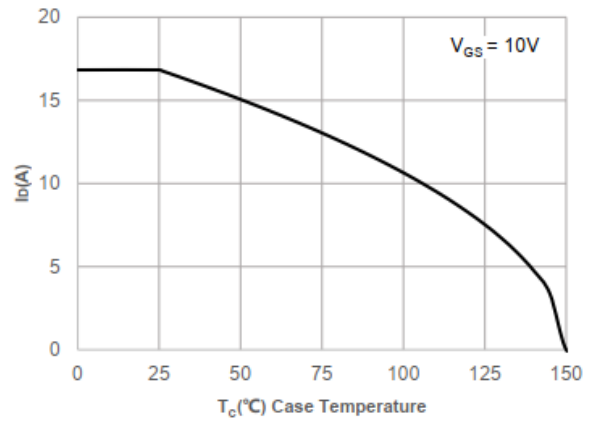


Figure 2. Current De-rating

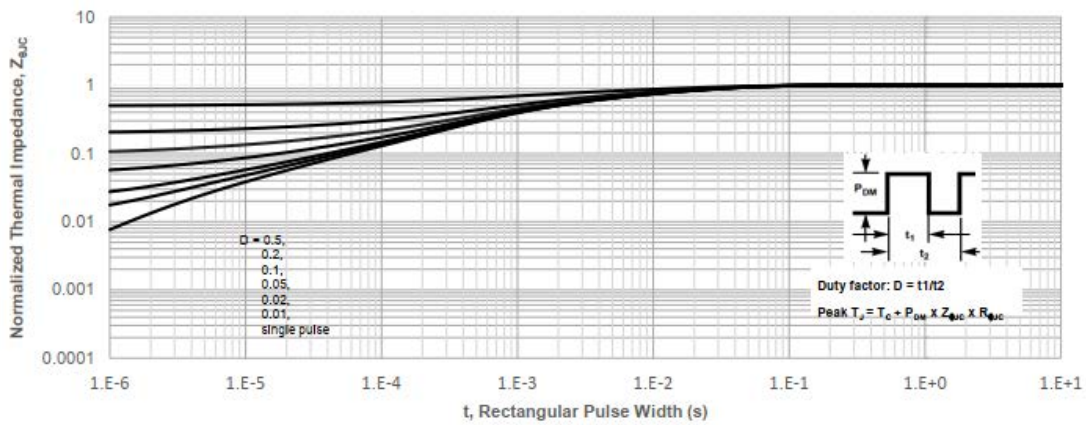


Figure 3. Normalized Maximum Transient Thermal Impedance

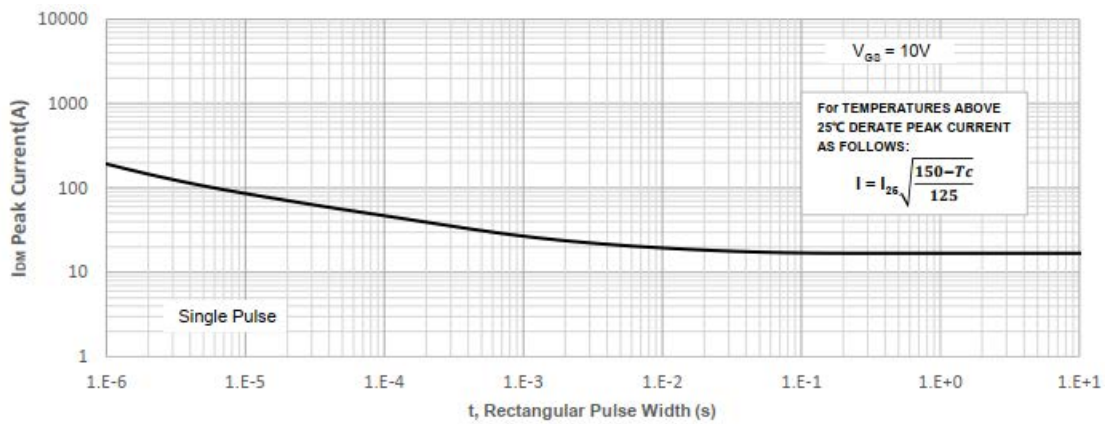


Figure 4. Peak Current Capacity

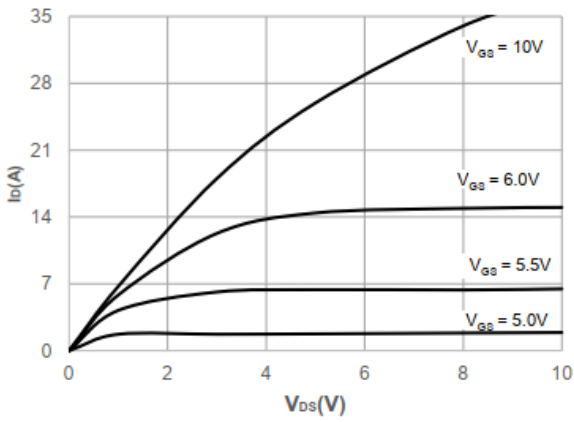


Figure 5. Output Characteristics

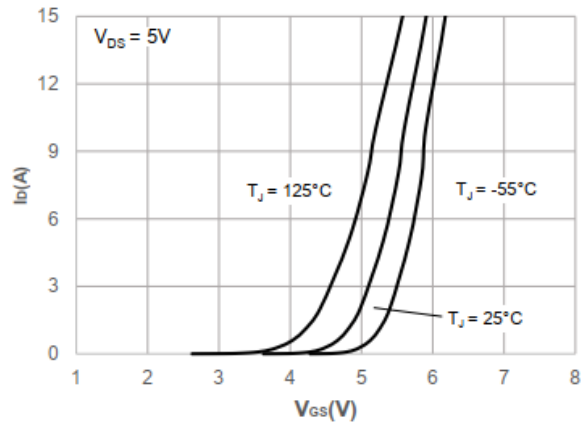


Figure 6. Typical Transfer Characteristics

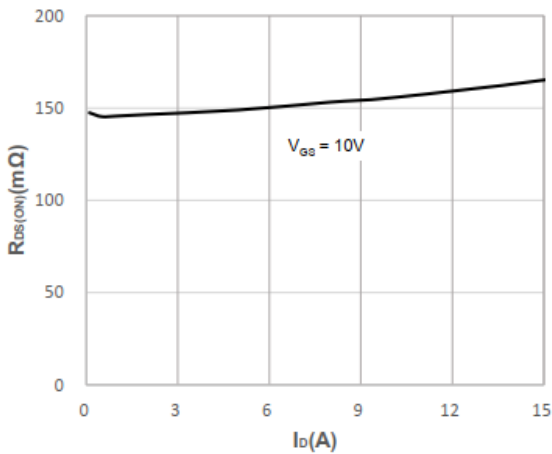


Figure 7. On-resistance vs. Drain Current

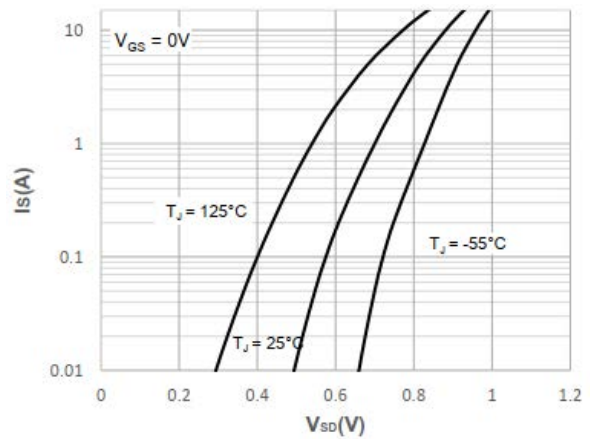


Figure 8. Body Diode Characteristics

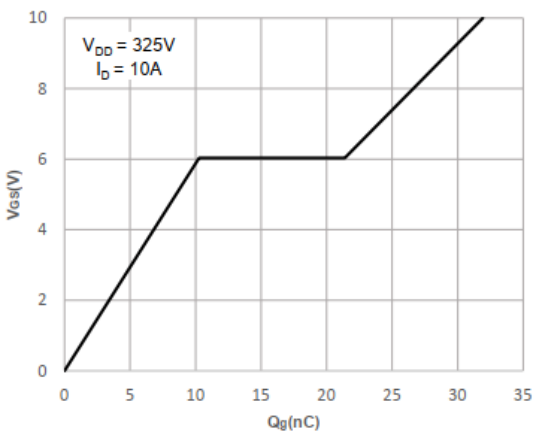


Figure 9. Gate Charge Characteristics

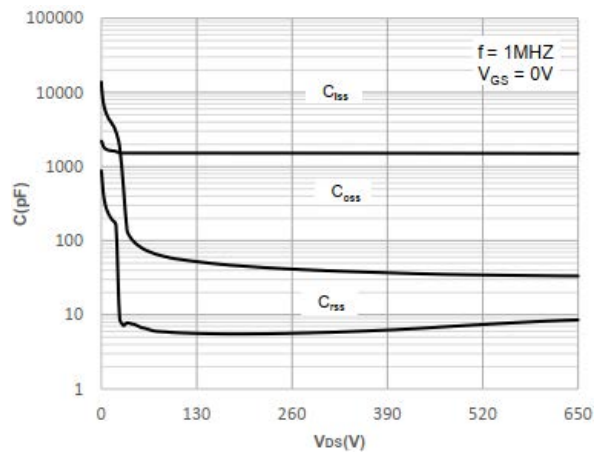


Figure 10. Capacitance Characteristics

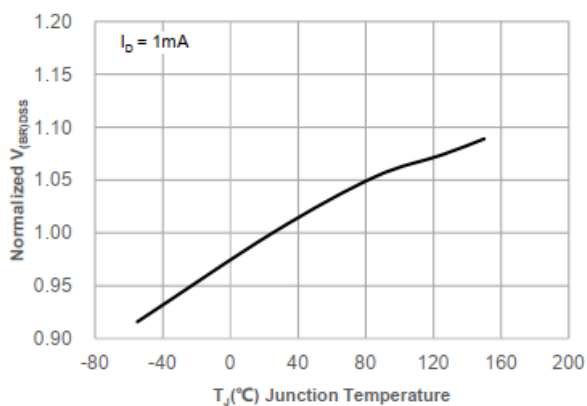


Figure 11. Normalized Breakdown voltage vs. Junction Temperature

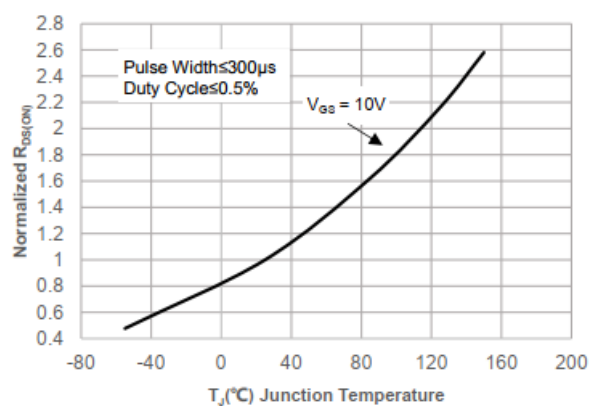


Figure 12. Normalized on Resistance vs. Junction Temperature

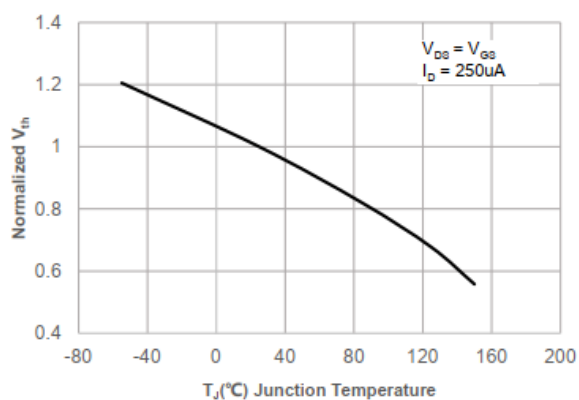


Figure 13. Normalized Threshold Voltage vs. Junction Temperature

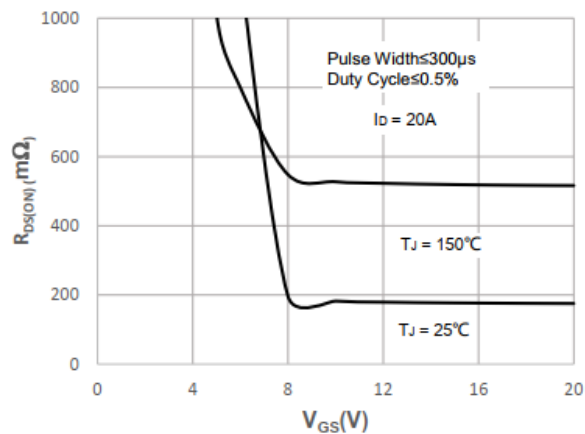


Figure 14. R_DS(ON) vs. V_GS

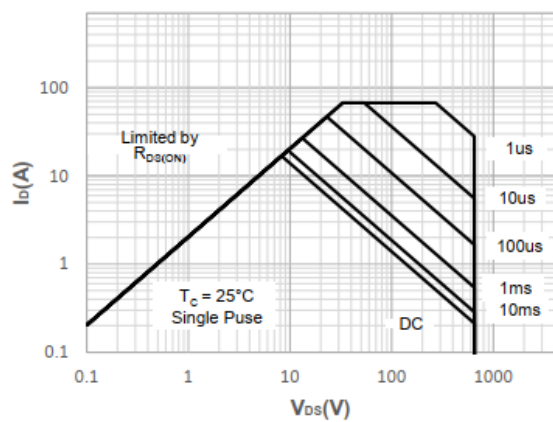
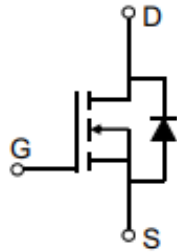
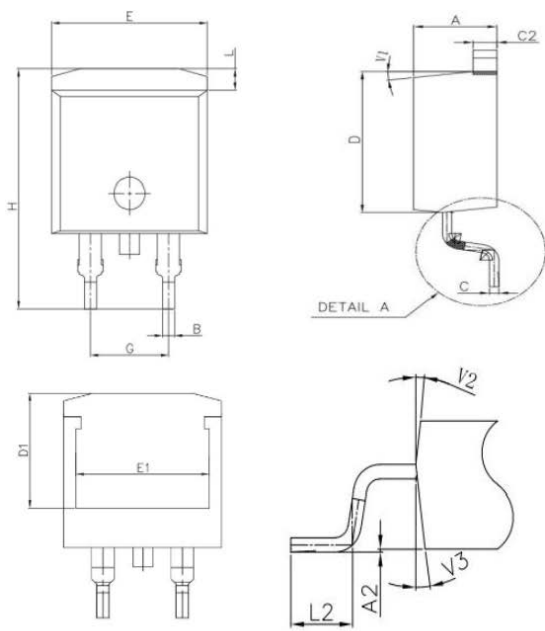


Figure 15. Maximum Safe Operating Area

- Circuit diagram



- Package outlines :



SYMBOL	DIMENSIONS		
	MIN	NOM	MAX
A	4.3	4.55	4.7
A2	0		0.15
B	0.75	0.8	0.85
C	0.38	0.46	0.55
C2	1.25	1.3	1.35
D	8.9	9.3	9.6
D1	7.4	7.65	7.9
E	9.9	10.05	10.21
E1	8.3	8.6	8.9
G	5.03	5.08	5.13
H	14.7	15	15.8
L2	2.2	2.35	2.5
L	1.16	1.36	1.61
V1	5°	7°	9°
V2	3°	5°	7°
V3	6°	8°	10°

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