N-Channel 650 V (D-S) Super Junction MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (mΩ) Typ.	I_D (A)	Q_g (TYP.)
650	75 at V_{GS} = 10 V	45	78 nC

FEATURES

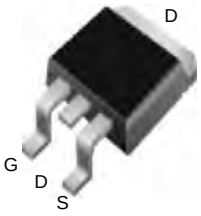
- Super Junction Power MOSFET
- Low $R_{DS(ON)}$
- Avalanche energy rated (UIS)

RoHS COMPLIANT

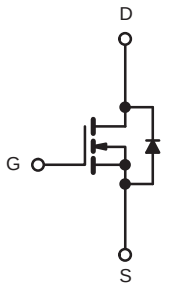
APPLICATIONS

- SMPS with PFC, Flyback and LLC topologies
- Micro inverter with DC/AC inverter topology

TO-263 Pin Configuration



Top View



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage		V_{GS}	± 30	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	45	A
	T_C = 100 °C		32	
Pulsed Drain Current (t = 100 µs)		I_{DM}	180	
Avalanche Current	L = 0.1 mH	I_{AS}	43	
Single Avalanche Energy [a]		E_{AS}	530	mJ
Maximum Power Dissipation [a]	T_C = 25 °C	P_D	389[b]	W
	T_C = 100 °C		194.5[b]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to +175	°C

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-Ambient (PCB Mount) [c]	t ≤ 10 s	R_{thJA}	65	°C/W
Junction-to-Case (Drain)	Steady State	R_{thJC}	0.35	

Notes

a. Duty cycle ≤ 1 %.
b. See SOA curve for voltage derating.
c. When mounted on 1" square PCB (FR4 material).

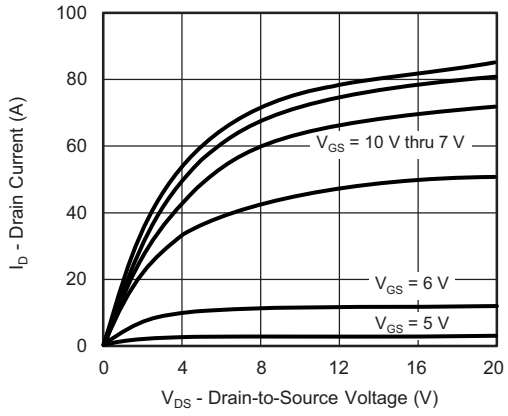
SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA	650	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	2	-	4	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 650 V, V_{GS} = 0 V	-	-	1	µA
		V_{DS} = 650 V, V_{GS} = 0 V, T_J = 100 °C	-	-	10	
On-State Drain Current [a]	$I_{D(on)}$	V_{DS} ≥ 10 V, V_{GS} = 10 V	45	-	-	A
Drain-Source On-State Resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 20 A	-	75	90	mΩ
Forward Transconductance [a]	g_{fs}	V_{DS} = 10 V, I_D = 20 A	-	25	-	S
Dynamic [b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 100 V, f = 1 MHz	-	4510	-	pF
Output Capacitance	C_{oss}		-	503	-	
Reverse Transfer Capacitance	C_{rss}		-	10	-	
Total Gate Charge [c]	Q_g	V_{DS} = 480 V, V_{GS} = 10 V, I_D = 20 A	-	78	-	nC
Gate-Source Charge [c]	Q_{gs}		-	28	-	
Gate-Drain Charge [c]	Q_{gd}		-	24	-	
Gate Resistance	R_g	f = 1 MHz	-	2.5	-	Ω
Turn-On Delay Time [c]	$t_{d(on)}$	V_{DS} = 480 V, I_D = 20 A, R_g = 5Ω, V_{GEN} = 10 V	-	51	-	ns
Rise Time [c]	t_r		-	60	-	
Turn-Off Delay Time [c]	$t_{d(off)}$		-	109	-	
Fall Time [c]	t_f		-	35	-	
Drain-Source Body Diode Ratings and Characteristics [b] (T_C = 25 °C)						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C	-	-	45	A
Pulsed Current (t = 100 µs)	I_{SM}		-	-	180	A
Forward Voltage [a]	V_{SD}	I_F = 20 A, V_{GS} = 0 V	-	-	1.2	V
Reverse Recovery Time	t_{rr}	I_F = 20 A, di/dt = 100 A/µs, V_{DS}= 480 V	-	395	-	ns
Reverse Recovery Charge	Q_{rr}		-	11	-	µC

Notes

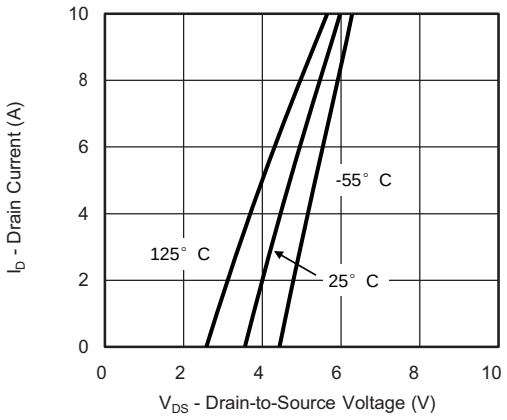
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

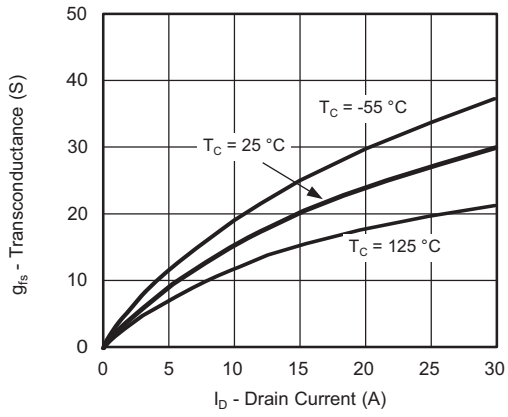
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



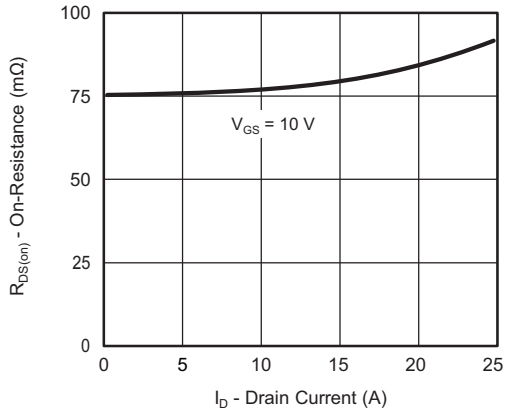
Output Characteristics



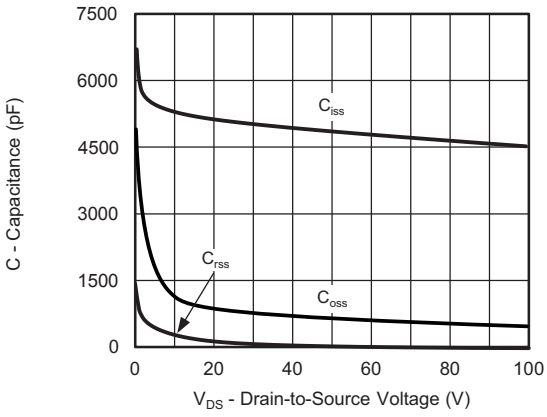
Transfer Characteristics



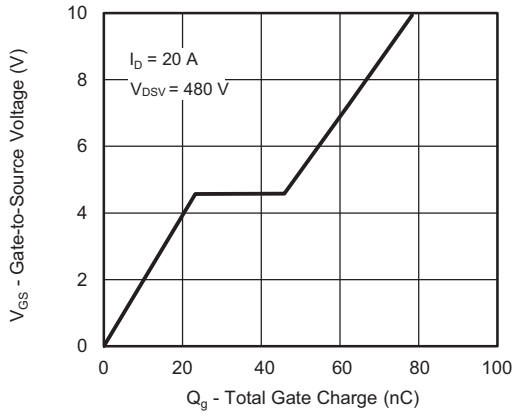
Transconductance



On-Resistance vs. Drain Current

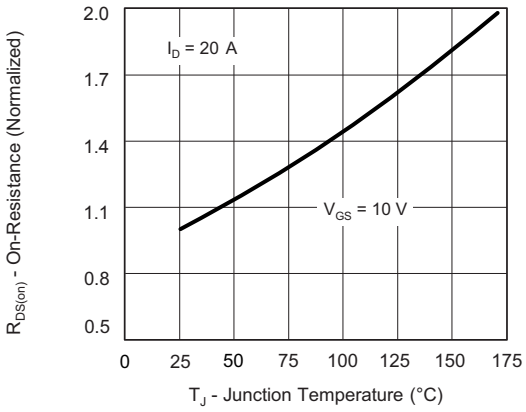


Capacitance

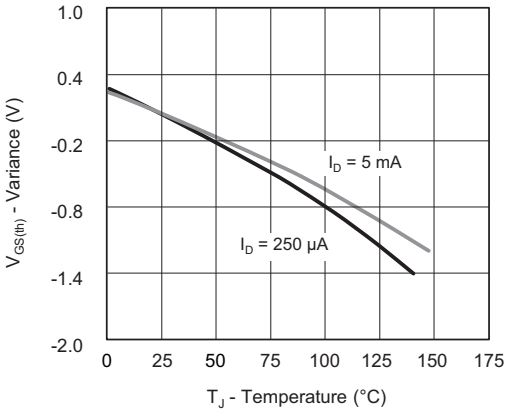


Gate Charge

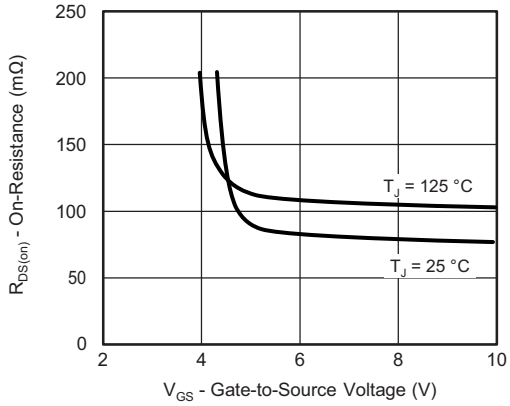
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



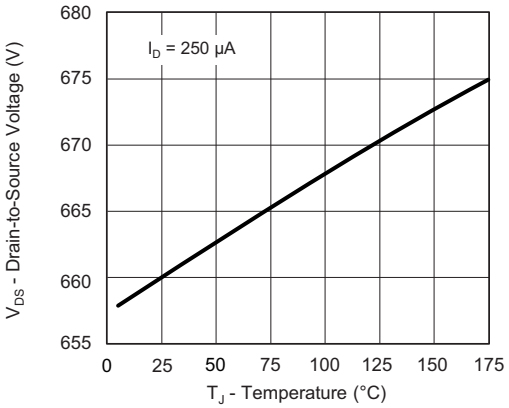
On-Resistance vs. Junction Temperature



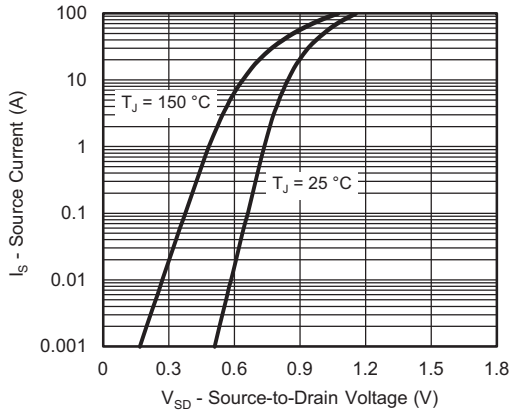
Threshold Voltage



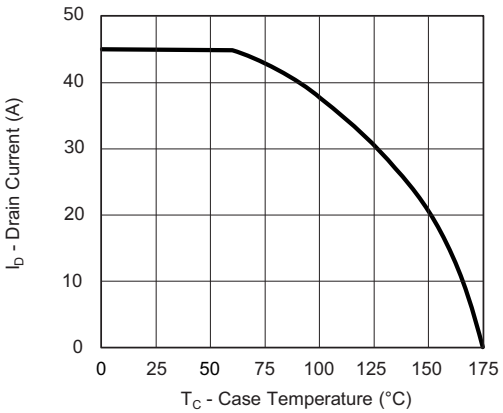
On-Resistance vs. Gate-to-Source Voltage



Drain Source Breakdown vs. Junction Temperature

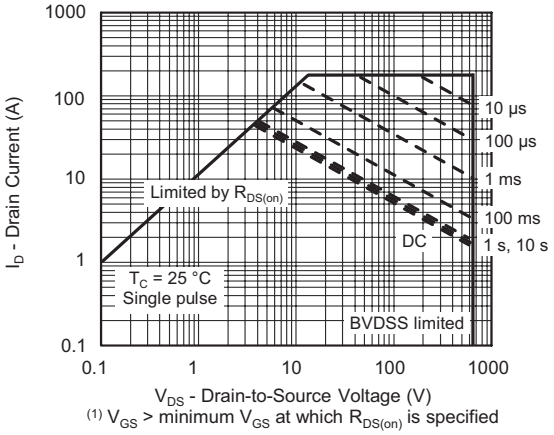


Source Drain Diode Forward Voltage

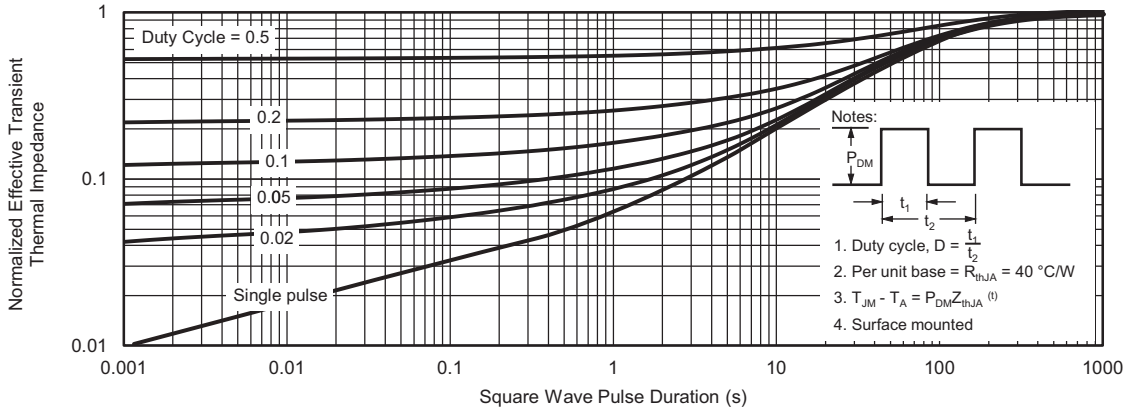


Current De-Rating

THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)

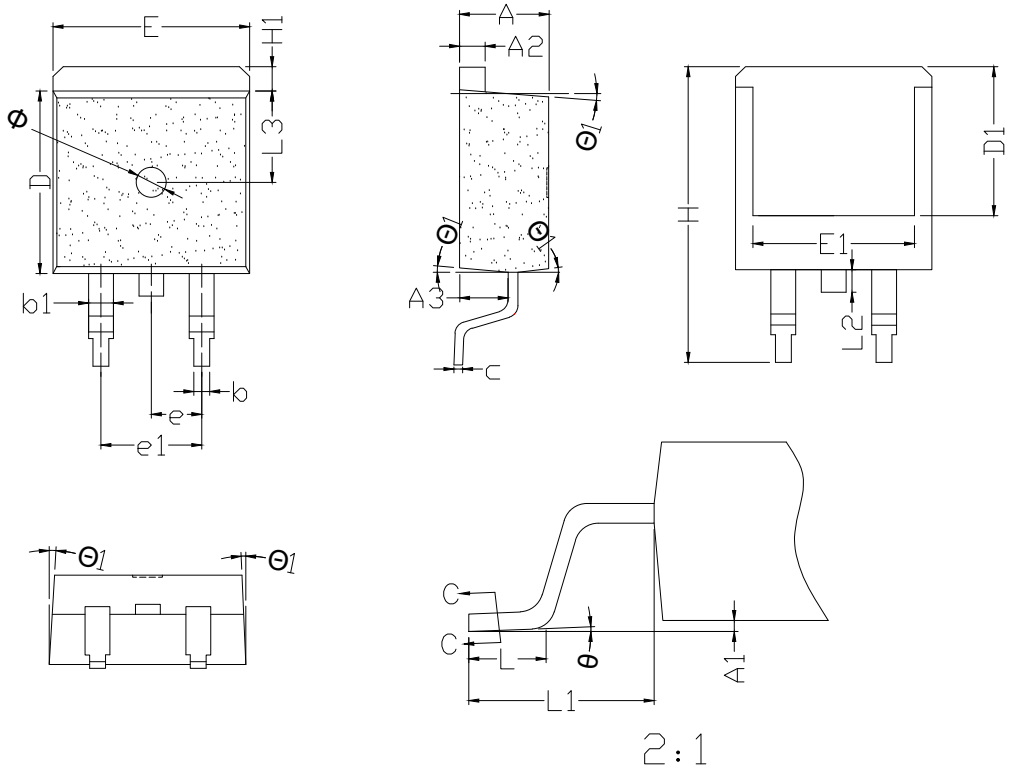


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

TO-263 PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	TYP	MAX	SYMBOL	MIN	TYP	MAX
A	4.10	4.50	4.80	e	2.35	2.54	2.75
A1	0.00	0.10	0.30	e1		5.08REF	
A2	1.10	1.30	1.50	H	14.50	15.15	16.00
A3	2.15	2.50	3.10	H1	1.00	1.28	1.75
b	0.60	0.80	1.05	L	1.80	2.23	2.90
b1	1.05	1.33	1.50	L1	4.30	4.75	5.50
c	0.33	0.50	0.66	L2	1.00	1.30	1.85
D	8.40	9.20	9.60	L3	0.90	4.65	9.00
D1		7.50REF		ϕ	0°	2°	5°
E	9.60	10.02	10.80	ϕ1	2°	-	7°
E1	7.60	9.88	10.30	Φ		1.5BSC	

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