N-Channel 60 V (D-S) Super Junction MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (mΩ)(Typ.)	I_D (A)[a]	Q_g (Typ.)
60	0.86 at V_{GS} = 10 V	330	109 nC

FEATURES

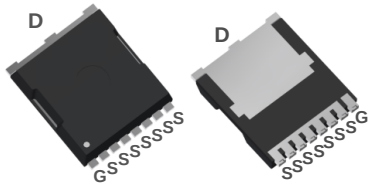
- DT- SJ Power MOSFET
- 100 % R_g and UIS Tested
- Low RDS(ON)

RoHS COMPLIANT

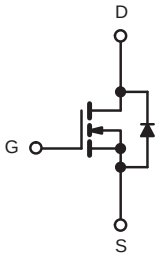
APPLICATIONS

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

TOLL 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}	60	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 175 °C)[a]	T_C = 25 °C	I_D	330	A
	T_C = 100 °C		250	
Pulsed Drain Current[b]		I_{DM}	1320	
Single Avalanche Energy		E_{AS}	2010	mJ
Maximum Power Dissipation[c]	T_C = 25 °C	P_D	326	W
	T_C = 100 °C		163	
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)[d]	R_{thJA}	40	°C/W
Junction-to-Case (Drain)	R_{thJC}	0.46	

Notes

a. Calculated continuous current based on maximum allowablejunction temperature.
b. Repetitive rating; pulse width limited by max. junction temperature.
c. Pd is based on max. junction temperature, using junction-case thermal resistance.
d. The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper,in a still air environment with Ta=25 °C.

SPECIFICATIONS (T_C = 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	60	-	-	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} = 60 V, V_{GS} = 0 V	-	-	1	µA
		V_{DS} = 48 V, V_{GS} = 0 V, T_J = 125 °C	-	-	100	
On-State Drain Current [a]	$I_{D(on)}$	V_{DS} ≥ 5 V, V_{GS} = 10 V	330	-	-	A
Drain-Source On-State Resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 20 A	-	0.86	1.1	mΩ
Forward Transconductance [a]	g_{fs}	V_{DS} = 5 V, I_D = 20 A	-	76	-	S
Dynamic [b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 30 V, f = 1 MHz	-	7208	-	pF
Output Capacitance	C_{oss}		-	3130	-	
Reverse Transfer Capacitance	C_{rss}		-	205	-	
Total Gate Charge [c]	Q_g	V_{DS} = 30 V, V_{GS} = 10 V, I_D = 20 A	-	109	-	nC
Gate-Source Charge [c]	Q_{gs}		-	27	-	
Gate-Drain Charge [c]	Q_{gd}		-	25	-	
Gate Resistance	R_g	f = 1 MHz	-	2.4	-	Ω
Turn-On Delay Time [c]	$t_{d(on)}$	V_{DD} = 30 V, I_D = 20 A, R_g = 3 Ω V_{GS} = 10 V	-	25	-	ns
Rise Time [c]	t_r		-	35	-	
Turn-Off Delay Time [c]	$t_{d(off)}$		-	64	-	
Fall Time [c]	t_f		-	88	-	
Drain-Source Body Diode Ratings and Characteristics [b] (T_C = 25 °C)						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C	-	-	330	A
Pulsed Current	I_{SM}		-	-	1320	A
Forward Voltage [a]	V_{SD}	I_F = 1A, V_{GS} = 0 V	-	0.7	1.2	V
Reverse Recovery Time	t_{rr}	I_F = 20 A, di/dt = 100 A/µs	-	73	-	ns
Reverse Recovery Charge	Q_{rr}		-	110	-	nC

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 CHARAC TERISTICS (25 °C, unless otherwise noted)

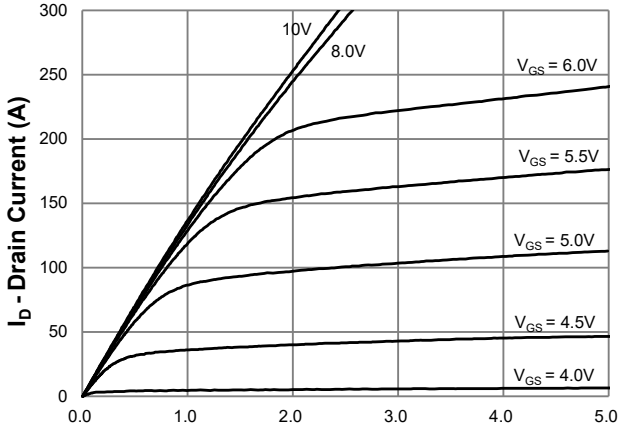


Figure 1: Output Characteristics

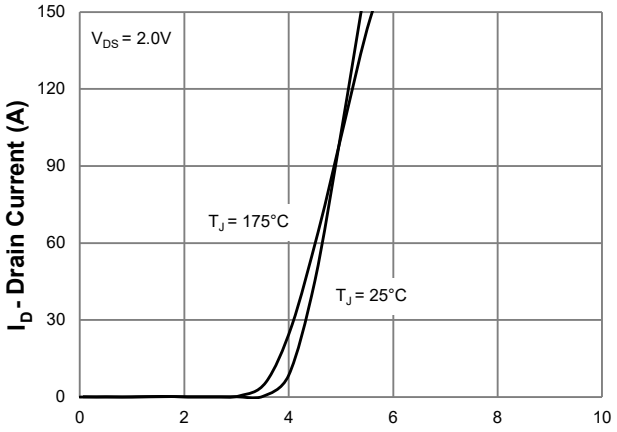


Figure 2: Transfer Characteristics

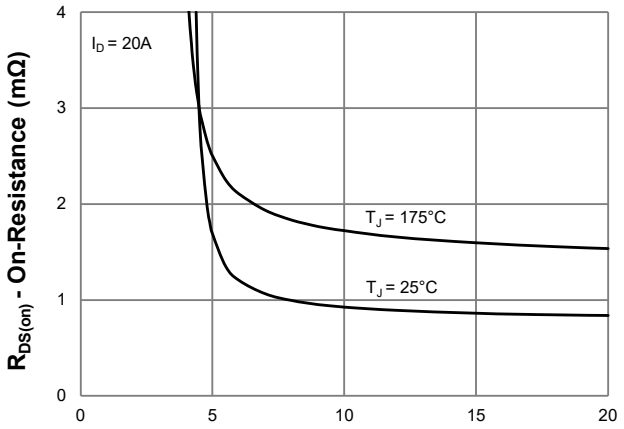


Figure 3: On-Resistance vs. Gate-Source Voltage

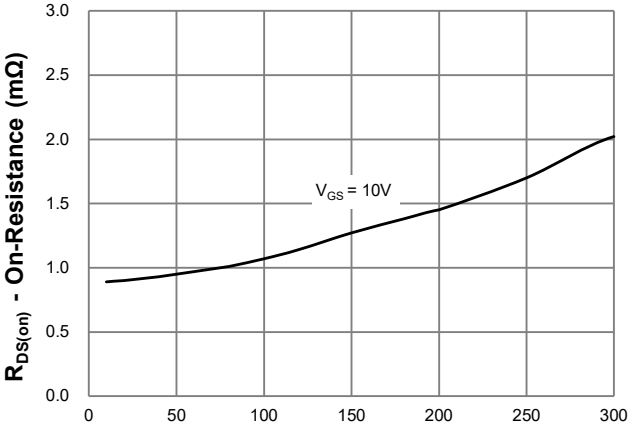


Figure 4: On-Resistance vs. Gate-Source Voltage

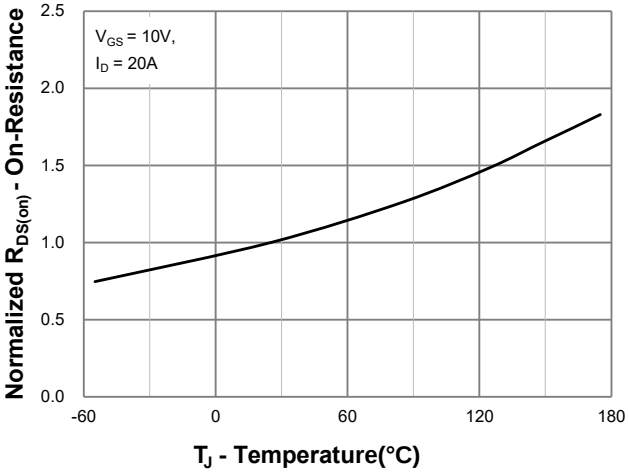


Figure 5: On-Resistance vs. Junction Temperature

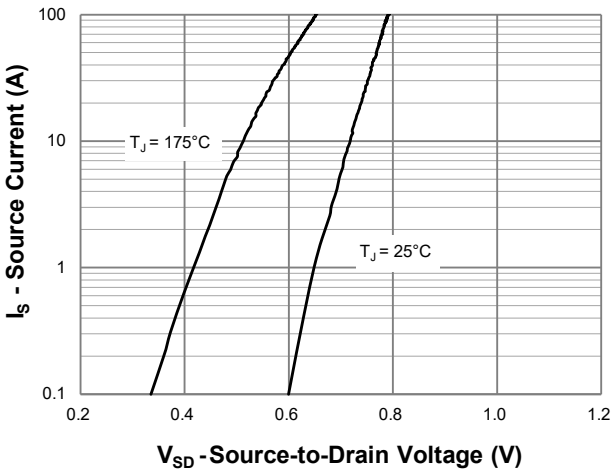


Figure 6: Source-Drain Diode Forward Voltage

TYPICAL CHARAC TERISTICS (25 °C, unless otherwise noted)

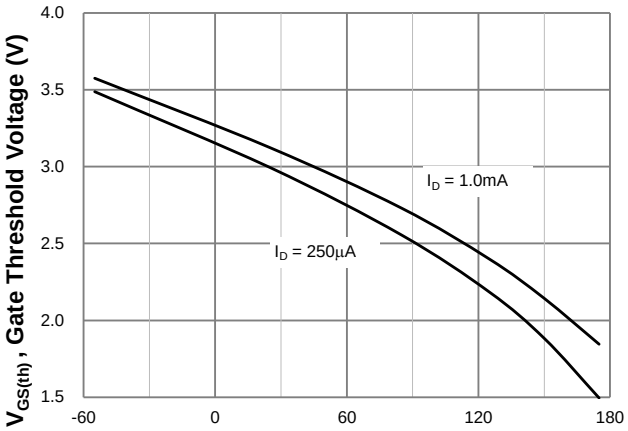


Figure 7: Gate Threshold Variation vs. Junction Temperature

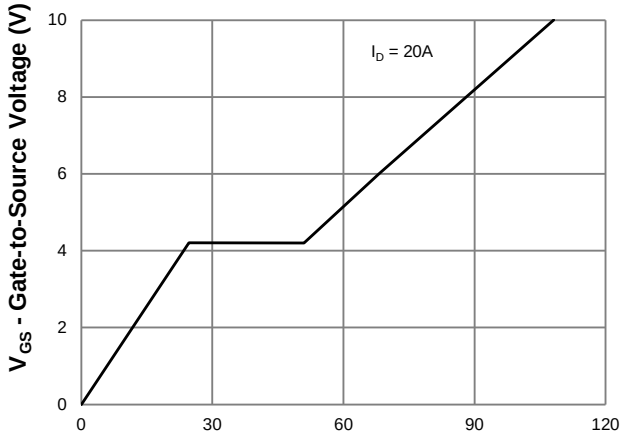


Figure8: Gate Charge Characteristics

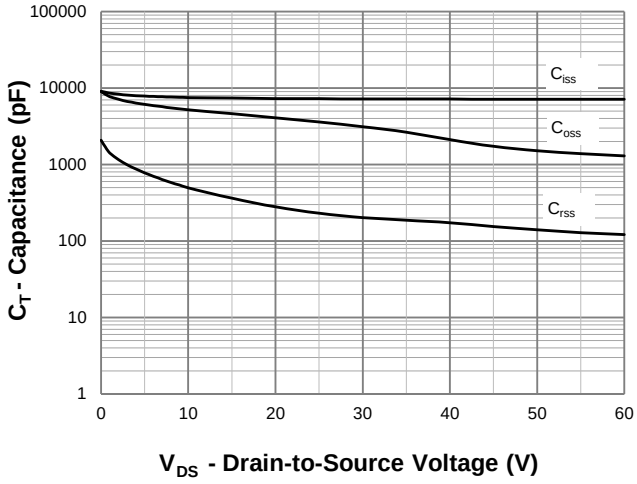


Figure 9: Capacitance Characteristics

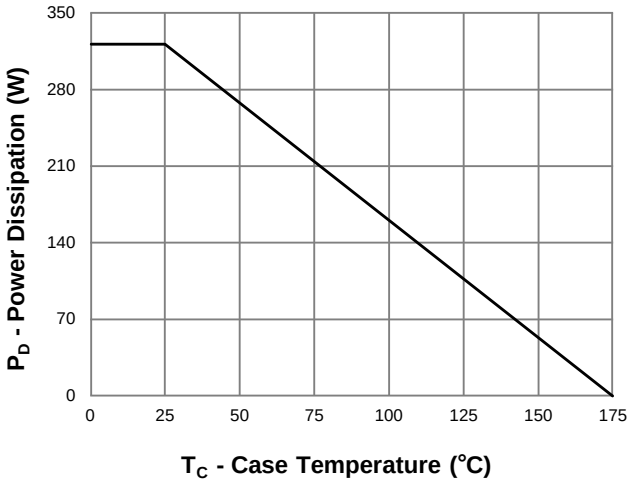


Figure 10: Power Derating

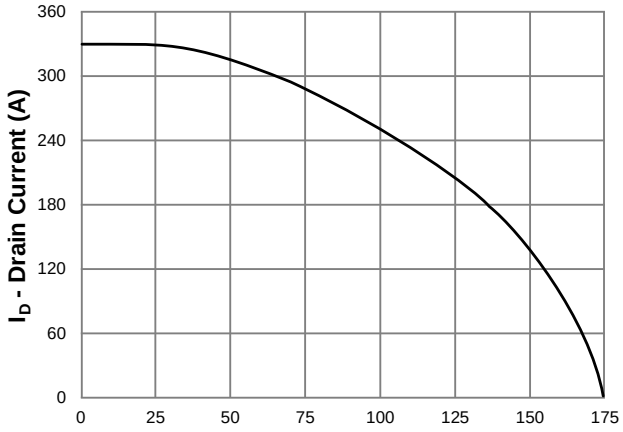


Figure 11: Current Derating

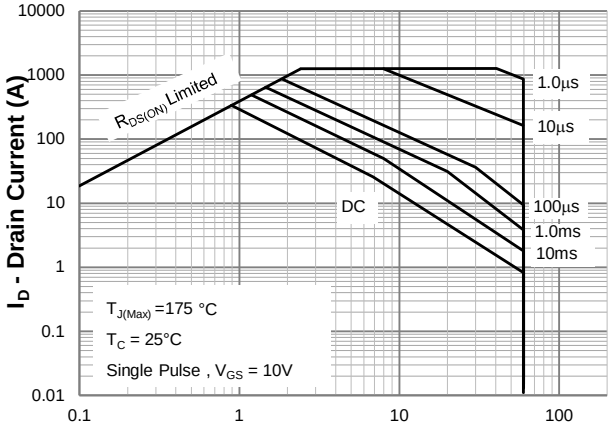


Figure 12: Safe Operating Area

TYPICAL CHARAC TERISTICS (25 °C, unless otherwise noted)

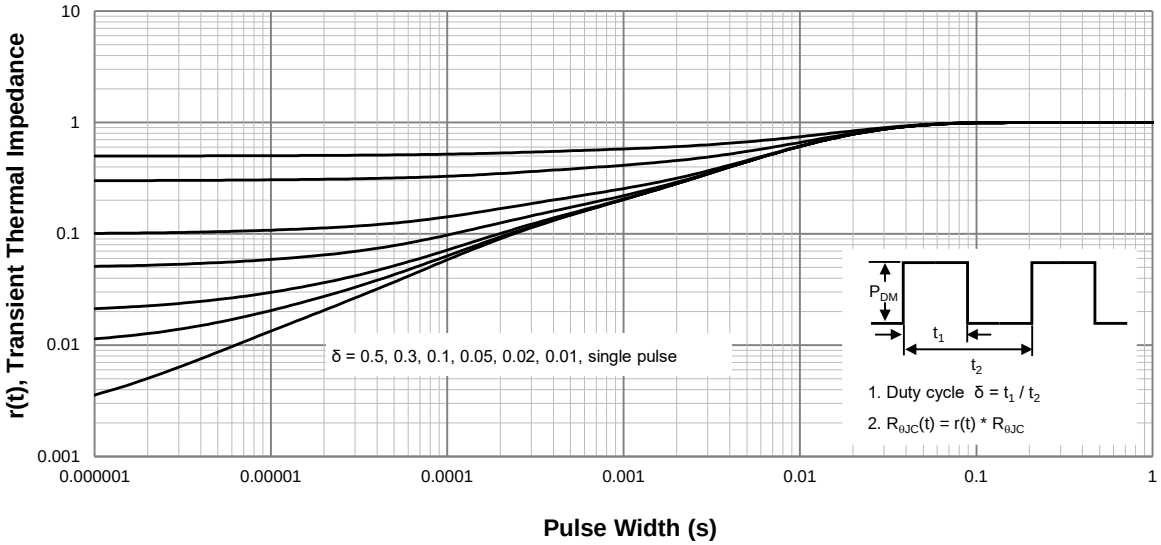
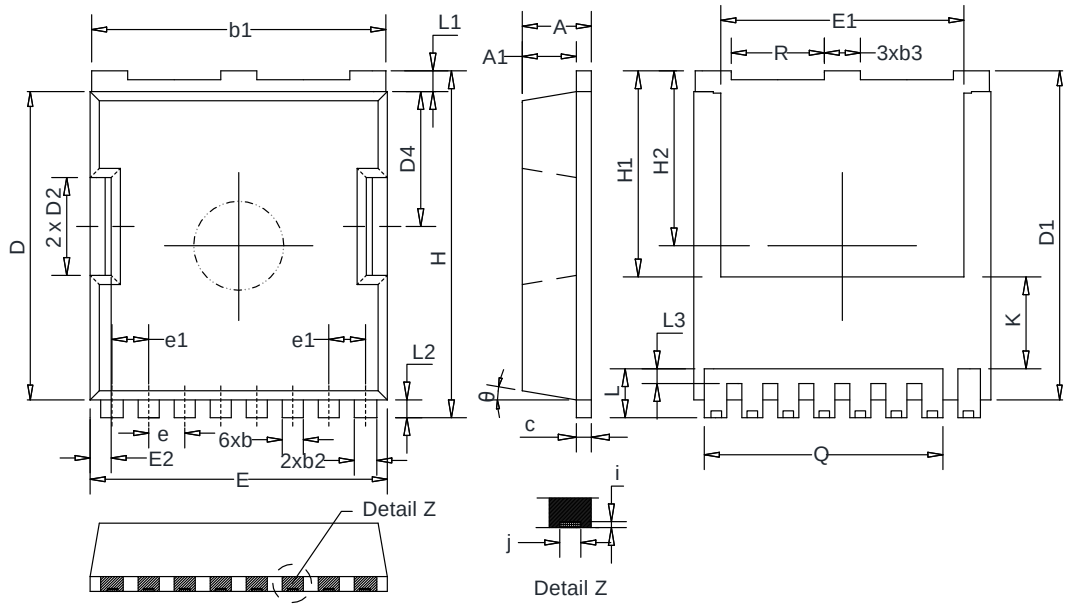


Figure 13: Normalized Maximum Transient Thermal Impedance

TOLL PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

Symbol	Min	Typ	Max		Symbol	Min	Typ	Max
A	2.05	2.30	2.65		E2	0.40	0.70	0.90
A1	1.50	1.80	2.10		H	11.30	11.70	12.10
b	0.50	0.70	0.90		H1	6.95 BSC		
b1	9.50	9.80	10.05		H2	5.90 BSC		
b2	0.50	0.75	1.00		i	0.10 REF		
b3	1.00	1.20	1.45		j	0.35 REF		
c	0.30	0.50	0.75		K	3.10 REF		
D	10.10	10.40	10.70		L	1.45	1.65	1.85
D1	10.80	11.10	11.40		L1	0.50	0.70	0.90
D2	3.10	3.30	3.50		L2	0.40	0.60	0.80
D4	4.35	4.55	4.80		L3	0.30	0.50	0.70
e	1.20 BSC				Q	7.95 REF		
e1	1.225 BSC				R	2.80	3.10	3.35
E	9.65	9.90	10.15		θ	10°REF		
E1	7.80	8.10	8.50					

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