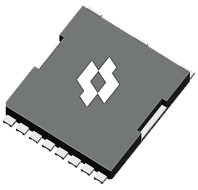
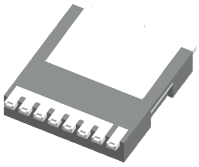
Product Summary

V_{DS}	$R_{DS(ON)\_TYP}$	I_{D_MAX}
200 V	8.0 mΩ @V_{GS} = 10V	159 A

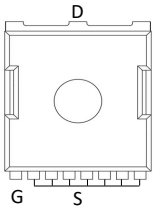
TOLL



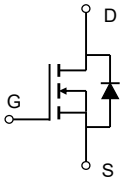
Top View



Bottom View



PIN Configuration
(Top View)



Schematic Diagram

Features

- Low On-Resistance
- Excellent FoM (figure of merit)
- 100% ΔVDS & UIS & Rg Tested

RoHS HALOGEN FREE

Applications

- DC/DC in Telecoms and Inductrial
- Synchronous Rectification in SMPS
- Hard Switching and High Speed Circuit

Mechanical Data

- Green Molding Compound
- Moisture Sensitivity: Level 1 per J-STD-020
- UL Flammability Classification Rating 94V-0

Ordering Information

Orderable Part Number	Package Type	Device Marking	Form	Quantity (pcs)
SMT20T09AHTL	TOLL	20T09AH	13" Tape&Reel	2,000

Maximum Ratings (@ T_C = 25°C, unless otherwise specified.)

Parameter		Symbol	Value	Unit
Drain - Source Voltage		V_{DS}	200	V
Gate - Source Voltage		V_{GS}	±20	V
Continuous Drain Current (V_{GS} = 10V) (1)	T_C = 25°C	I_D	159	A
	T_C = 100°C		112	A
Pulsed Drain Current (2)		I_{DM}	539	A
Single Pulse Avalanche Energy (3)		E_{AS}	1674	mJ
Single Pulse Avalanche Current (L= 0.1mH)		I_{AS}	70	A
Power Dissipation	T_C = 25°C	P_D	652	W
	T_C = 100°C		326	W
Junction & Storage Temperature Range		T_J, T_{STG}	-55 ~ +175	°C

Thermal Characteristics

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient (4)	$R_{\theta JA}$	20	25	°C/W
Thermal Resistance, Junction-to-Case (5)	$R_{\theta JC}$	0.23	0.30	°C/W

Electrical Characteristics (@ T_J = 25°C, unless otherwise specified.)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Off Characteristics (6)						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	200	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 200V, V_{GS} = 0V	-	-	1.0	μA
		T_J = 125°C	-	-	100	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V	-	-	±100	nA
On Characteristics (6)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS} = V_{DS}, I_D = 250μA	2.5	3.4	4.5	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 80A	-	8.0	9.2	mΩ
Forward Transconductance	g_{fs}	V_{DS} = 5.0V, I_D = 20A	-	58	-	S
Diodes Forward Voltage	V_{SD}	I_S = 2.0A, V_{GS} = 0V	-	0.7	1.2	V
Dynamic Characteristics (7)						
Input Capacitance	C_{iss}	V_{DS} = 100V, V_{GS} = 0V, f = 1MHz	-	6100	-	pF
Output Capacitance	C_{oss}		-	436	-	pF
Reverse Transfer Capacitance	C_{rss}		-	15	-	pF
Gate Resistance	R_g	V_{GS} = 0V, V_{DS} = 0V, f = 1MHz	-	2.2	-	Ω
Switching Characteristics (7)						
Turn-On DelayTime	$t_{d(on)}$	V_{GS} = 10V, V_{DS} = 100V I_D = 80A, R_{GEN} = 3.0Ω	-	19	-	ns
Rise Time	t_r		-	35	-	ns
Turn-Off DelayTime	$t_{d(off)}$		-	59	-	ns
Fall Time	t_f		-	37	-	ns
Gate Charge Characteristics (7)						
Total Gate Charge (V_{GS} = 10V)	Q_g	V_{DS} = 100V, I_D = 80A V_{GS} = 10V	-	88	-	nC
Total Gate Charge (V_{GS} = 6.0V)	Q_g		-	58	-	nC
Gate-Source Charge	Q_{gs}		-	25	-	nC
Gate-Drain Charge	Q_{gd}		-	21	-	nC
Gate Plateau Voltage	$V_{plateau}$		-	4.5	-	V
Drain-Source Diode Characteristics (7)						
Body Diode Reverse Recovery Time	t_{rr}	I_F = 80A, dI/dt = 100A/μs, T_J = 25°C	-	125	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	659	-	nC
Diode Forward Current	I_S	T_C = 25°C	-	-	159	A

Notes:

1. This current is chip limited, which is calculated based on Rthjc.
2. This current is calculated on single pulse with 10us Single Pulse.
3. Defined by design, not subject to production test, E_{AS} condition: T_J=25°C, V_{DD}=100V, V_{GS}=10V, L=1.0mH.
4. Device mounted on FR-4 substrate PC board with 2oz copper in 1inch square cooling area.
5. Thermal resistance from junction to the exposed pad.
6. Short duration pulse test used to minimize self-heating effect.
7. Defined by design, not subject to production.

Typical Electrical and Thermal Characteristics

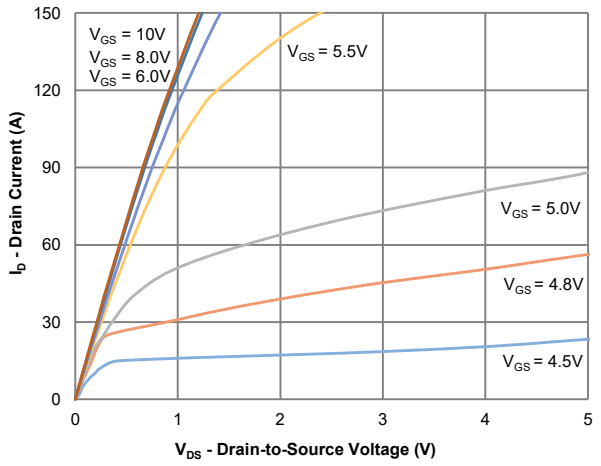


Figure 1: Output Characteristics

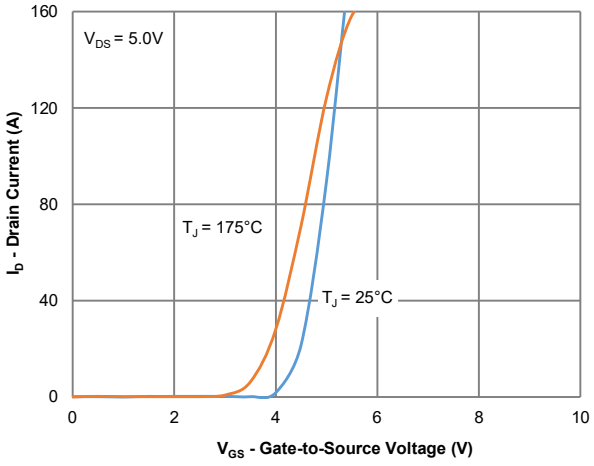


Figure 2: Transfer Characteristics

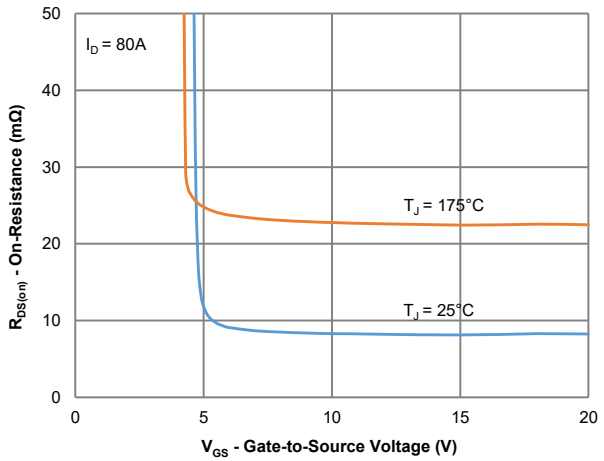


Figure 3: On-Resistance vs. Gate-Source Voltage

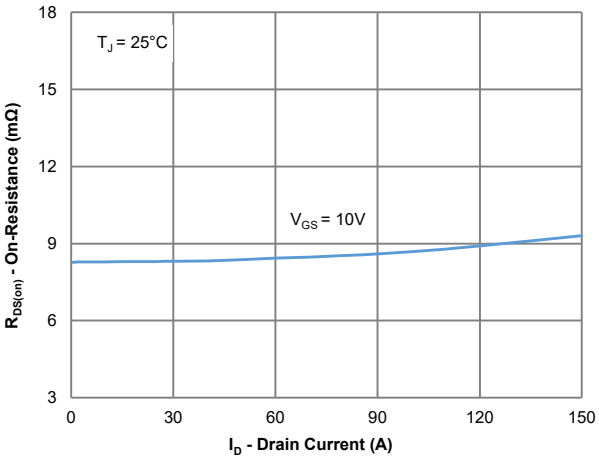


Figure 4: On-Resistance vs. Drain Current and Gate Voltage

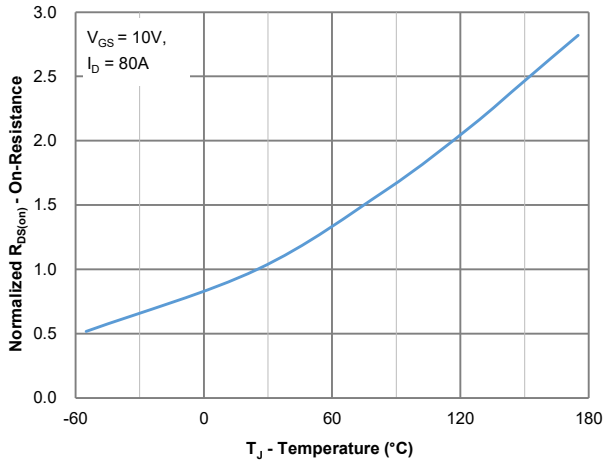


Figure 5: On-Resistance vs. Junction Temperature

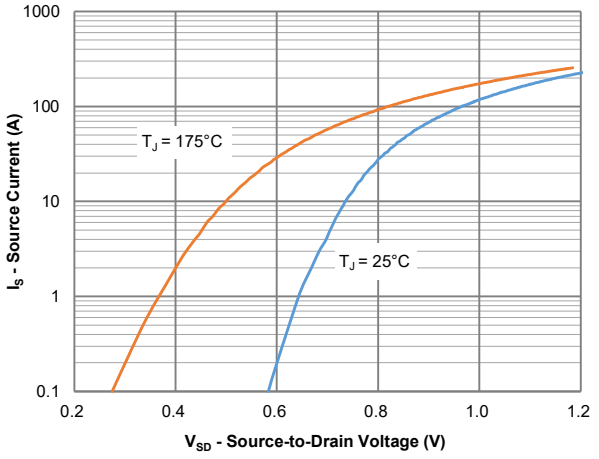


Figure 6: Source-Drain Diode Forward Voltage

Typical Electrical and Thermal Characteristics

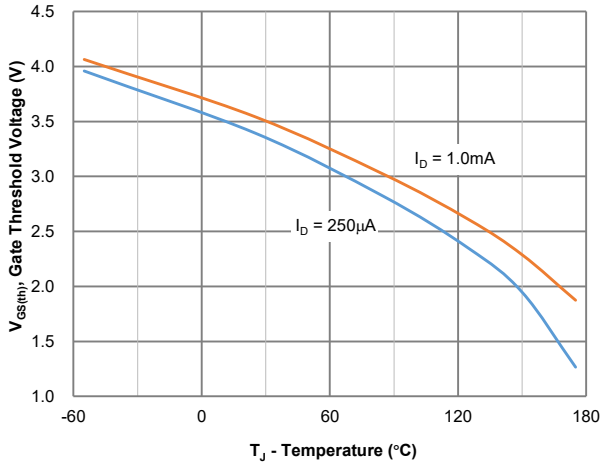


Figure 7: Gate Threshold Variation vs. Junction Temperature

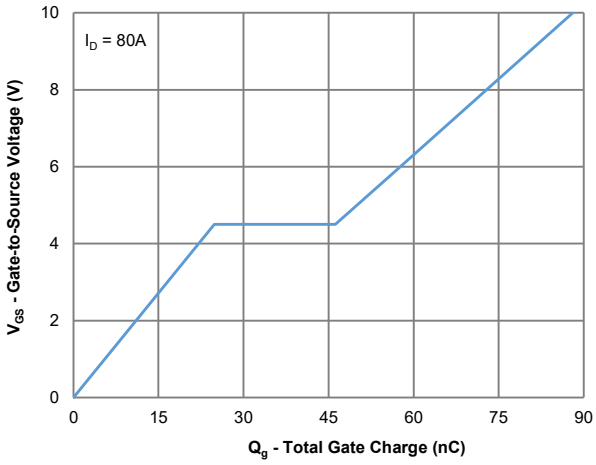


Figure 8: Gate Charge Characteristics

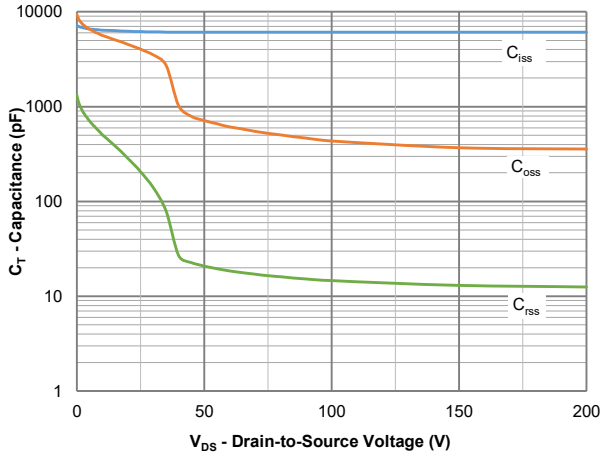


Figure 9: Capacitance Characteristics

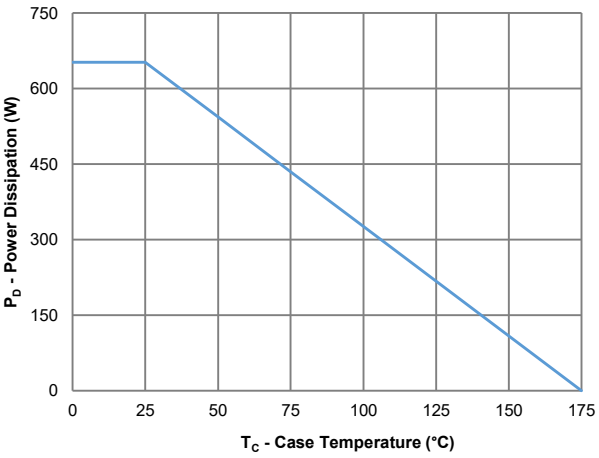


Figure 10: Power Derating

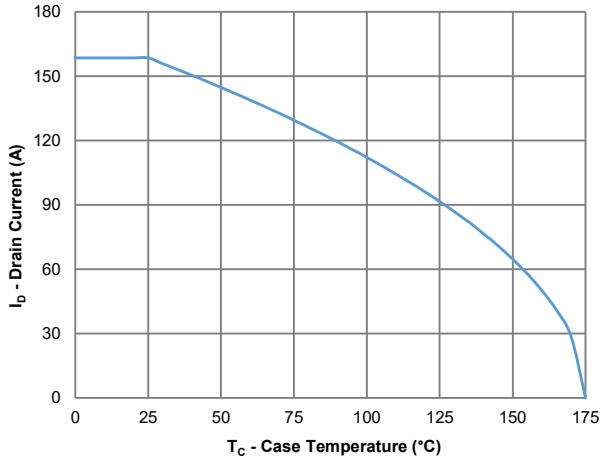


Figure 11: Current Derating

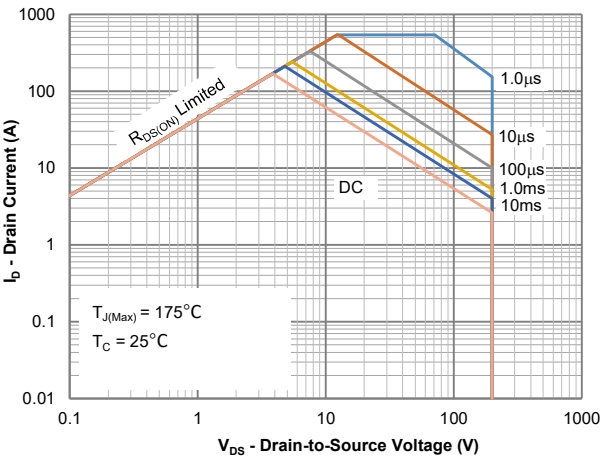


Figure 12: Safe Operating Area

Typical Electrical and Thermal Characteristics

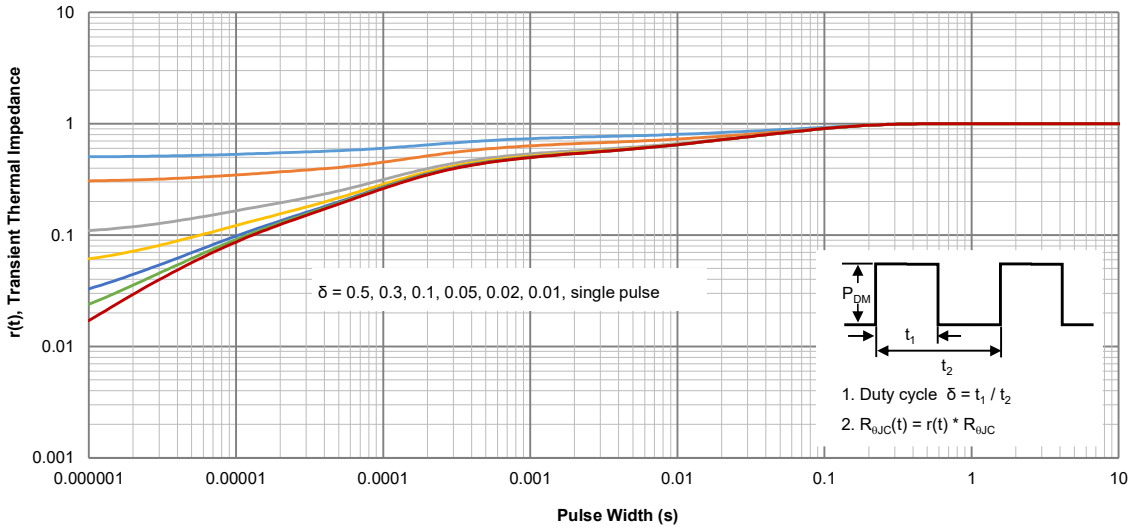
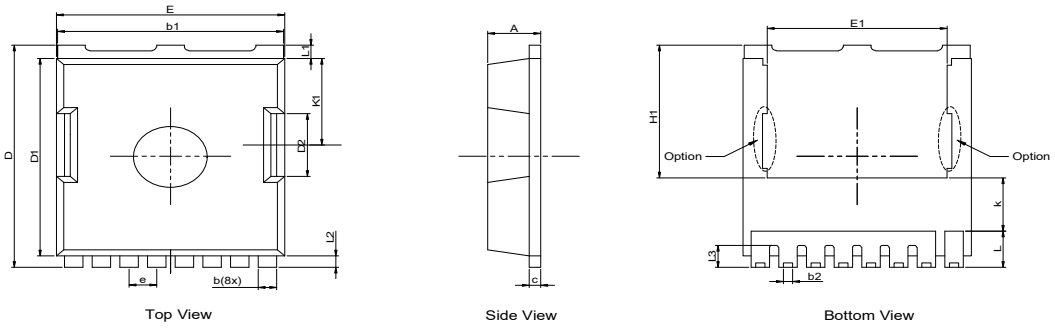


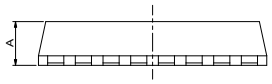
Figure 13: Normalized Maximum Transient Thermal Impedance

TOLL Package Outline

Package Outlines



Top View　　Side View　　Bottom View

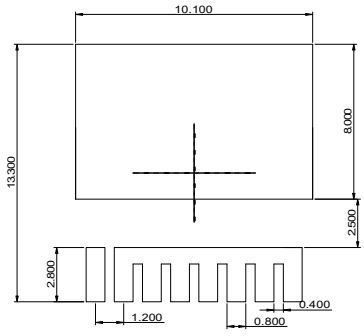


Front View

NOTES:
1. DIMENSION AND TOLERANCE PER ASME Y14.5M, 1994.
2. ALL DIMENSIONS IN MILLIMETER.
3. DIMENSIONS "E" AND "D1" DO NOT INCLUDE BURRS OR MOLD FLASH. PROTRUSIONS OR GATE BURRS.

DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	2.200	2.300	2.400
b	0.650	0.800	0.900
b1	9.650	9.800	9.950
b2		0.400 REF	
c	0.400	0.500	0.600
D	11.480	11.680	11.950
D1	10.250	--	10.700
D2	2.850	--	3.400
E	9.700	9.900	10.100
E1	8.000	--	9.250
e		1.200 BSC	
H1	6.700	7.000	7.300
k		3.000 REF	
k1		4.550 REF	
L	1.350	--	2.100
L1		0.700 REF	
L2		0.600 REF	
L3	0.950	1.200	1.350

Recommended Soldering Footprint



DIMENSIONS:MILLIMETERS