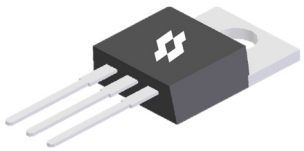
Product Summary

V_{DS}	$R_{DS(ON)_TYP}$		I_{D_MAX}
200 V	7.8 mΩ @V_{GS} = 10V	TO263-3L	122 A
	8.0 mΩ @V_{GS} = 10V	TO220-3L	

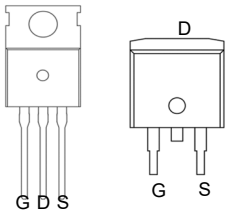
TO220-3L



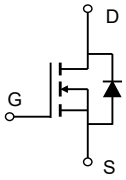
Top View

TO263-3L

Top View



PIN Configuration



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)
SMT20T09AHS	TO220-3L	20T09AH	Tube	50
SMT20T09AHT	TO263-3L	20T09AH	13" Tape&Reel	1,000

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	122	A
	T_C = 100°C		86	A
Pulsed Drain Current (2)		I_{DM}	500	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	375	W
	T_C = 100°C		188	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)	$R_{\theta JA}$	25	30	°C/W
Thermal Resistance, Junction-to-Case (5)	$R_{\theta JC}$	0.40	0.45	°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 = 20A	TO263-3L	-	7.8	9.0	mΩ
			TO220-3L	-	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 = 20A, 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 = 20A 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 = 20A, 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		-	-	122	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

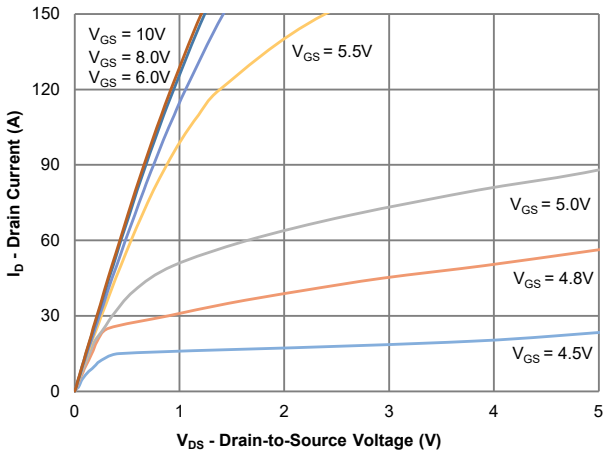


Figure 1: Output Characteristics

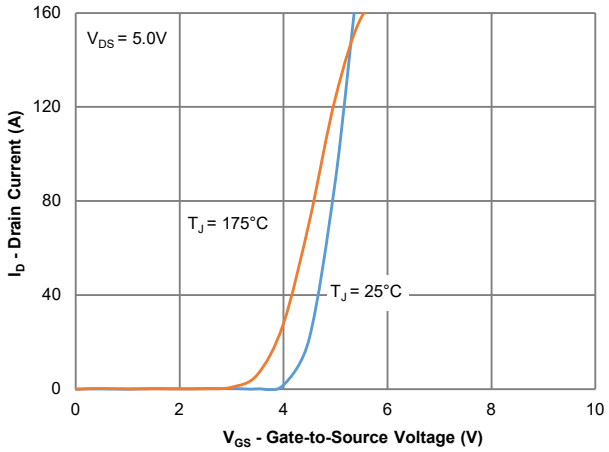


Figure 2: Transfer Characteristics

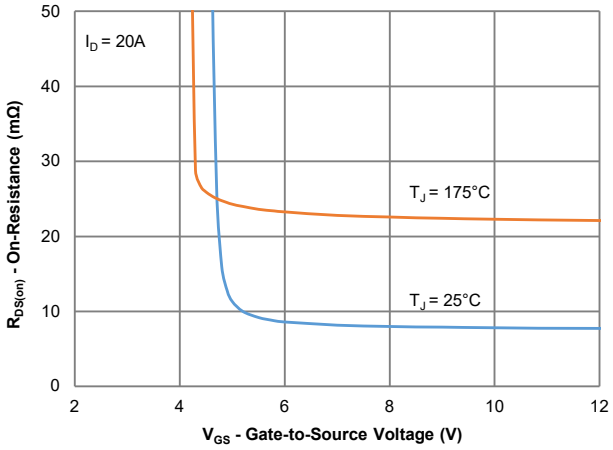


Figure 3: On-Resistance vs. Gate-Source Voltage

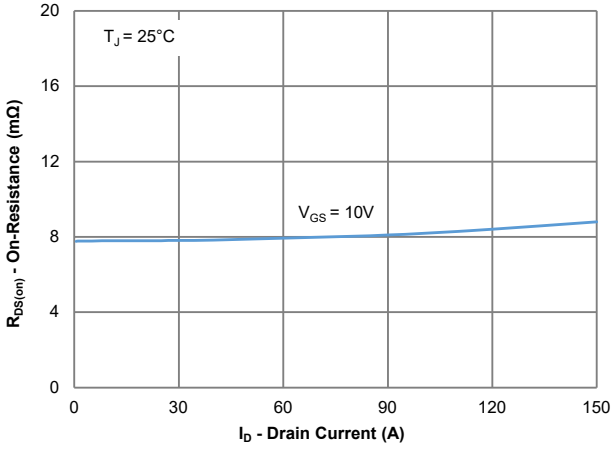


Figure 4: On-Resistance vs. Drain Current and Gate Voltage

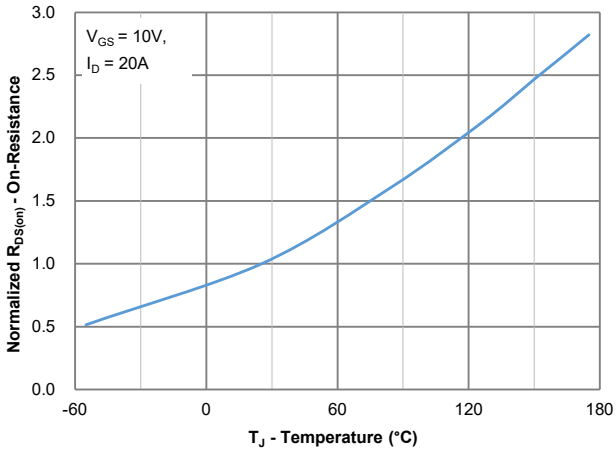


Figure 5: On-Resistance vs. Junction Temperature

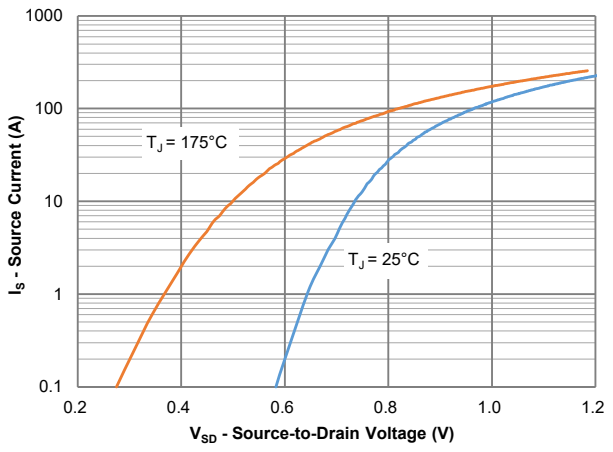


Figure 6: Source-Drain Diode Forward Voltage

Typical Electrical and Thermal Characteristics

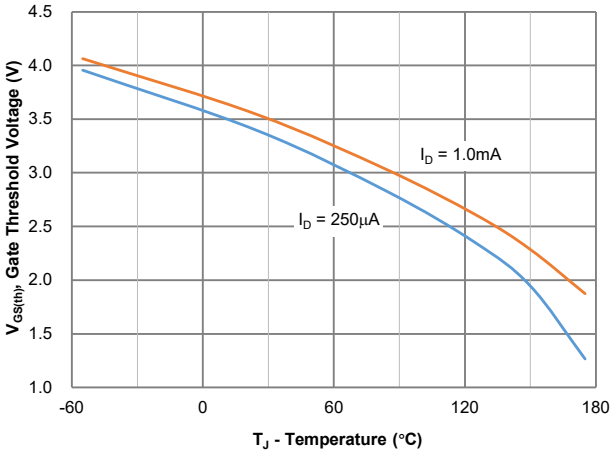


Figure 7: Gate Threshold Variation vs. Junction Temperature

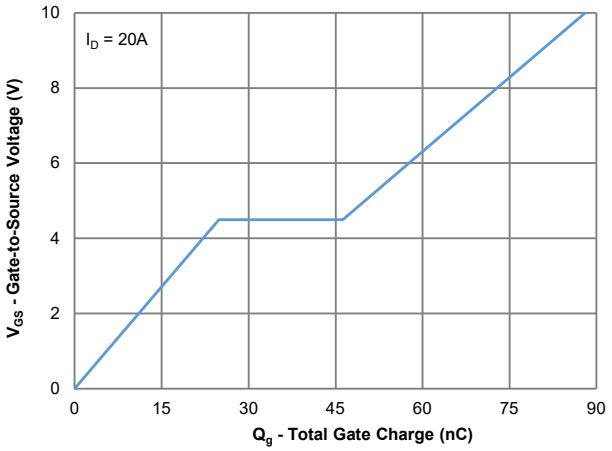


Figure 8: Gate Charge Characteristics

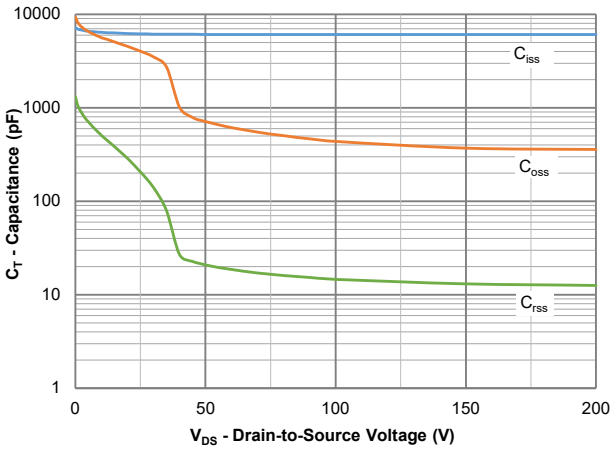


Figure 9: Capacitance Characteristics

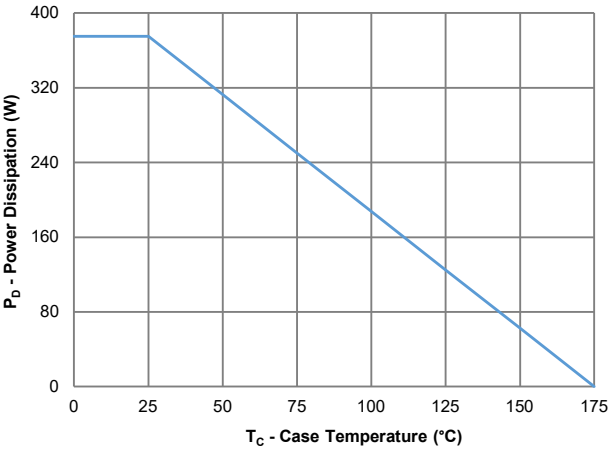


Figure 10: Power Derating

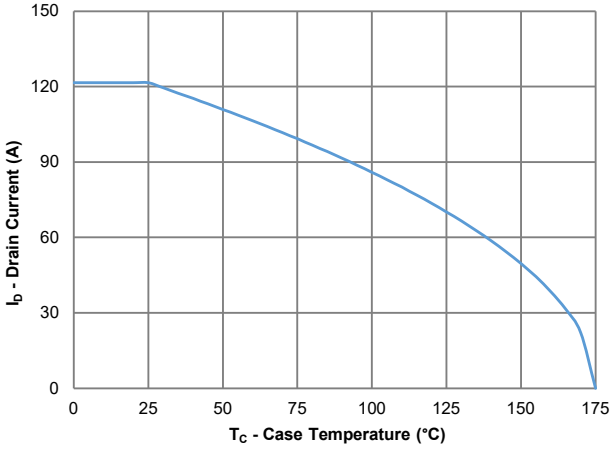


Figure 11: Current Derating

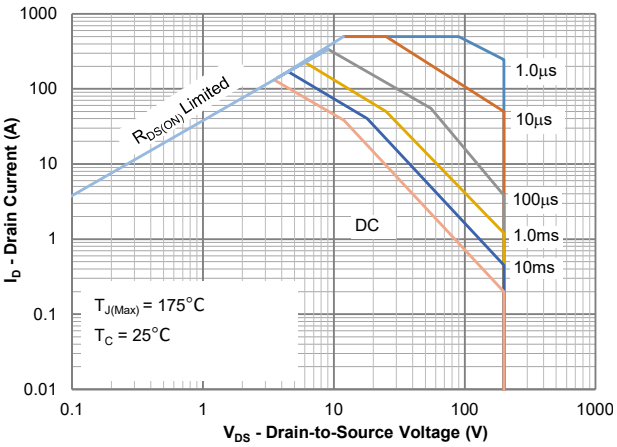


Figure 12: Safe Operating Area

Typical Electrical and Thermal Characteristics

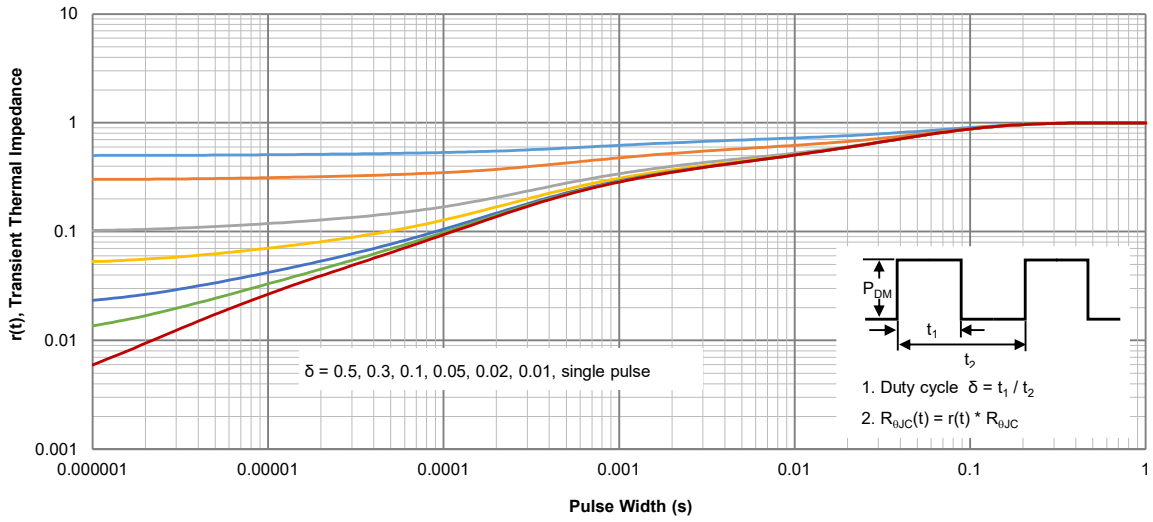
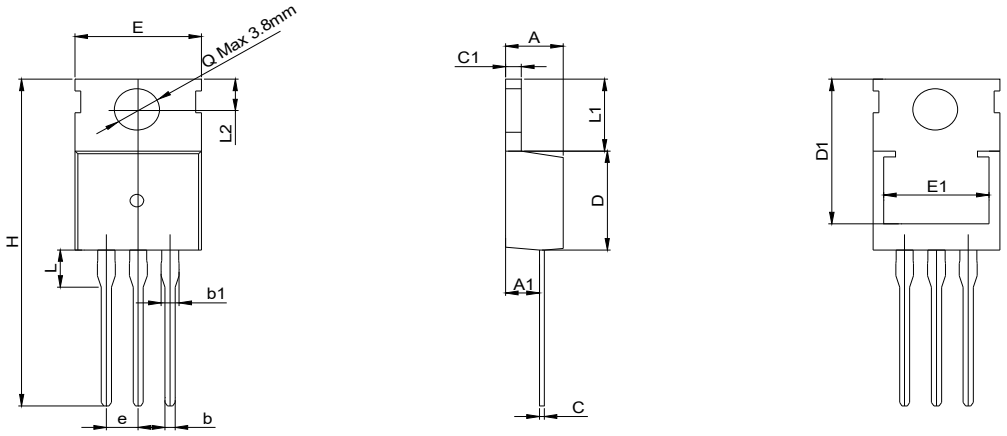


Figure 13: Normalized Maximum Transient Thermal Impedance

TO220-3L Package Outline

Package Outline



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
2. ALL DIMNESIONS IN MILLIMETER (ANNGLE IN DEGREE).
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH.

DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	4.35	4.50	4.70
A1	2.20	2.30	3.00
b	0.70	0.80	0.95
b1	1.10	1.30	1.50
C	0.45	0.50	0.60
C1	1.23	1.30	1.40
H	28.00	28.80	29.80
D	8.80	9.21	9.90
D1	12.80	13.20	13.60
E	9.70	10.00	10.50
E1	7.40	8.00	8.60
L	--	--	3.80
L1	6.25	6.50	6.90
L2	2.40	2.90	3.05
e	2.54 BSC		