

Product Summary

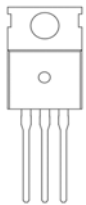
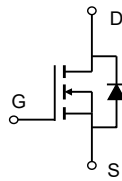
V_{DS}	$R_{DS(ON)_TYP}$	I_{D_MAX}
60 V	2.3 m Ω @ $V_{GS} = 10V$	201 A

TO220-3L


Top View



Bottom View


 PIN Configuration
(Top View)


Schematic Diagram

Features

- Low On-Resistance
- Excellent FoM (figure of merit)
- 100% ΔV_{DS} & UIS & R_g Tested


Applications

- DC/DC in telecoms and industrial
- Synchronous rectification in SMPS
- Hard switching and high speed circuit

Mechanical Data

- Green molding compound
- UL flammability classification rating 94V-0

Ordering Information

Orderable Part Number	Package Type	Device Marking	Form	Quantity (pcs)
SMN6003AHS	TO220-3L	6003AH	Tube	50

Maximum Ratings (@ $T_C = 25^\circ\text{C}$, unless otherwise specified.)

Parameter	Symbol	Value	Unit
Drain - Source Voltage	V_{DS}	60	V
Gate - Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($V_{GS} = 10V$) ⁽¹⁾	I_D	201	A
		127	A
Pulsed Drain Current ⁽²⁾	I_{DM}	806	A
Single Pulse Avalanche Energy ⁽³⁾	E_{AS}	1380	mJ
Single Pulse Avalanche Current ($L = 0.1\text{mH}$)	I_{AS}	88	A
Power Dissipation	P_D	231	W
		93	W
Junction & Storage Temperature Range	T_J, T_{STG}	-55 ~ +150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient ⁽⁴⁾	$R_{\theta JA}$	40	50	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case ⁽⁵⁾	$R_{\theta JC}$	0.42	0.54	$^\circ\text{C/W}$

Electrical Characteristics (@ $T_J = 25^\circ\text{C}$, 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	60	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 60V, 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	2.0	3.0	4.0	V
Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} = 10V, I _D = 20A	-	2.3	3.0	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} = 30V, V _{GS} = 0V, f = 1MHz	-	11537	-	pF
Output Capacitance	C _{oss}		-	842	-	pF
Reverse Transfer Capacitance	C _{rss}		-	760	-	pF
Gate Resistance	R _g	V _{GS} = 0V, V _{DS} = 0V, f = 1MHz	-	0.57	-	Ω
Switching Characteristics ⁽⁷⁾						
Turn-On DelayTime	t _{d(on)}	V _{GS} = 10V, V _{DS} = 30V I _D = 20A, R _{GEN} = 3.0Ω	-	22	-	ns
Rise Time	t _r		-	32	-	ns
Turn-Off DelayTime	t _{d(off)}		-	102	-	ns
Fall Time	t _f		-	44	-	ns
Gate Charge Characteristics ⁽⁷⁾						
Total Gate Charge (V _{GS} = 10V)	Q _g	V _{DS} = 30V, I _D = 20A V _{GS} = 10V	-	214	-	nC
Total Gate Charge (V _{GS} = 7.0V)	Q _g		-	159	-	nC
Gate-Source Charge	Q _{gs}		-	43	-	nC
Gate-Drain Charge	Q _{gd}		-	67	-	nC
Gate Plateau Voltage	V _{plateau}		-	4.4	-	V
Drain-Source Diode Characteristics ⁽⁷⁾						
Body Diode Reverse Recovery Time	t _{rr}	I _F = 20A, dI/dt = 100A/μs, T _J = 25°C	-	47	-	ns
Body Diode Reverse Recovery Charge	Q _{rr}		-	60	-	nC
Diode Forward Current	I _S	T _C = 25°C	-	-	201	A

Notes:

1. This current is chip limited, which is calculated based on R_{thjc} .
2. This current is calculated on single pulse with 10 μs Pulse.
3. Defined by design, not subject to production test, E_{AS} condition: $T_J=25^\circ\text{C}$, $V_{DD}=30V$, $V_{GS}=10V$, $L=1.0\text{mH}$.
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

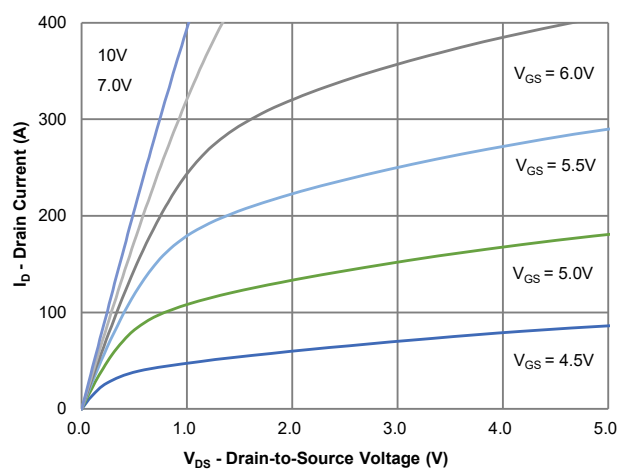


Figure 1: Output Characteristics

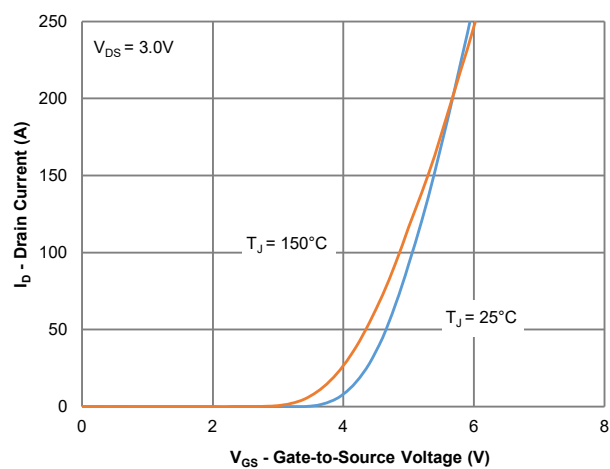


Figure 2: Transfer Characteristics

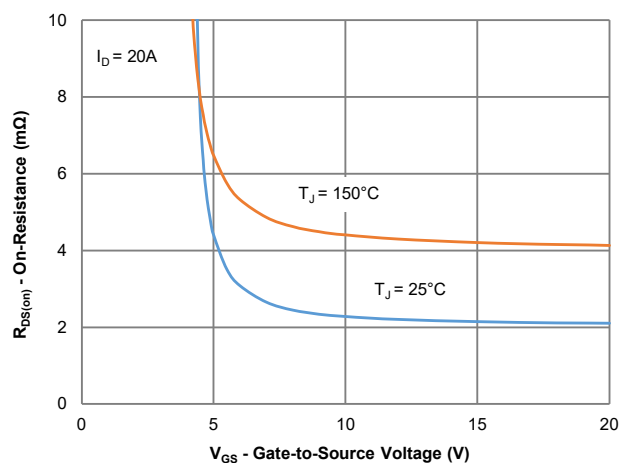


Figure 3: On-Resistance vs. Gate-Source Voltage

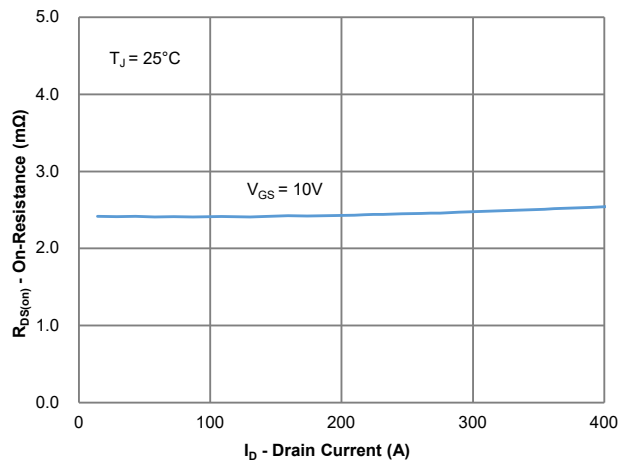


Figure 4: On-Resistance vs. Drain Current and Gate Voltage

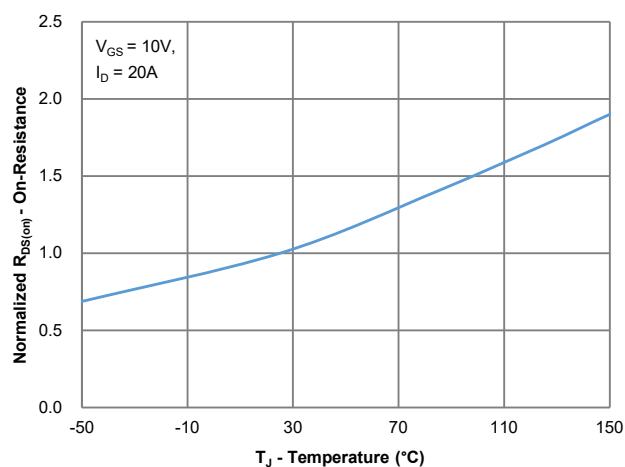


Figure 5: On-Resistance vs. Junction Temperature

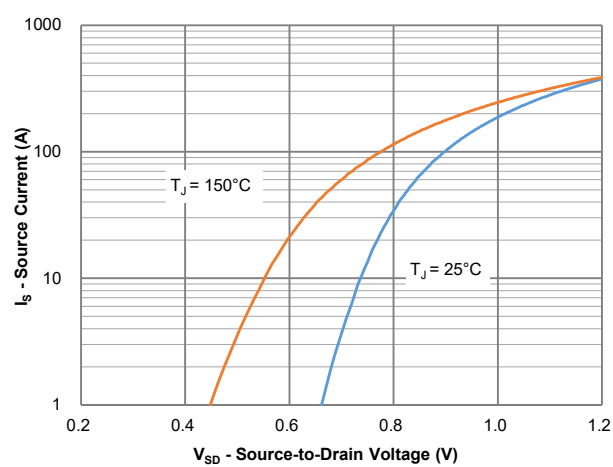


Figure 6: Source-Drain Diode Forward Voltage

Typical Electrical and Thermal Characteristics

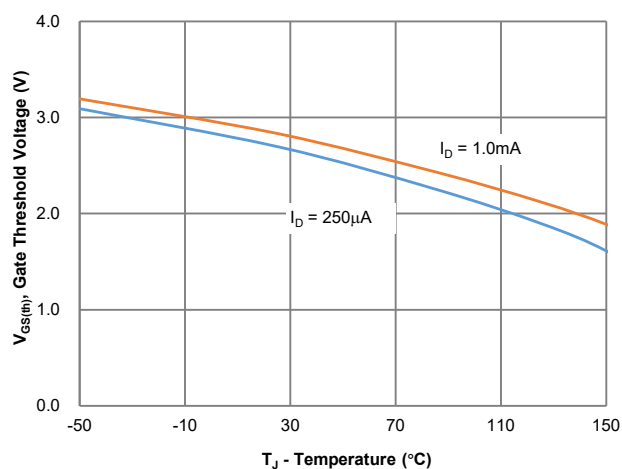


Figure 7: Gate Threshold Variation vs. Junction Temperature

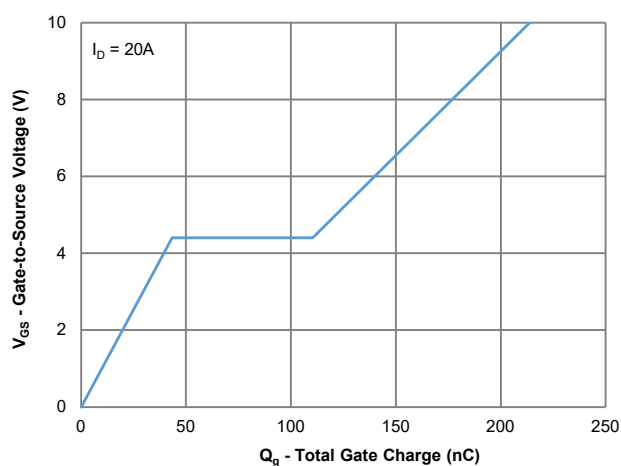


Figure 8: Gate Charge Characteristics

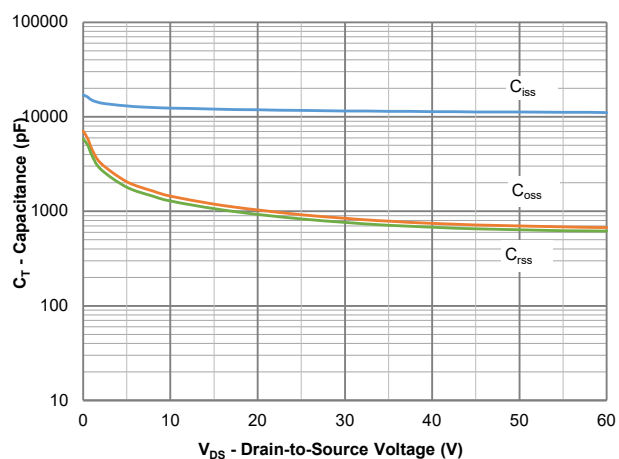


Figure 9: Capacitance Characteristics

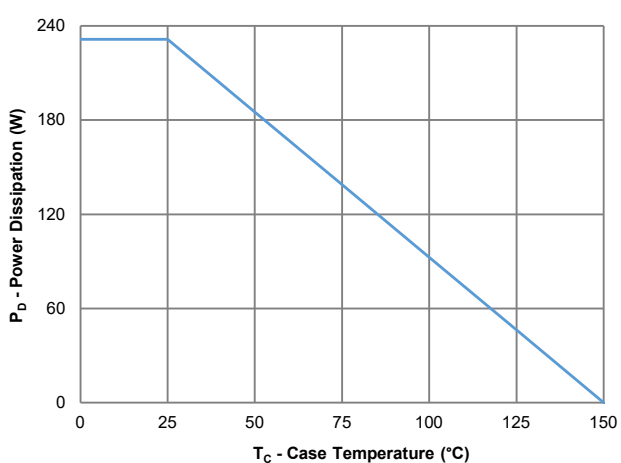


Figure 10: Power Derating

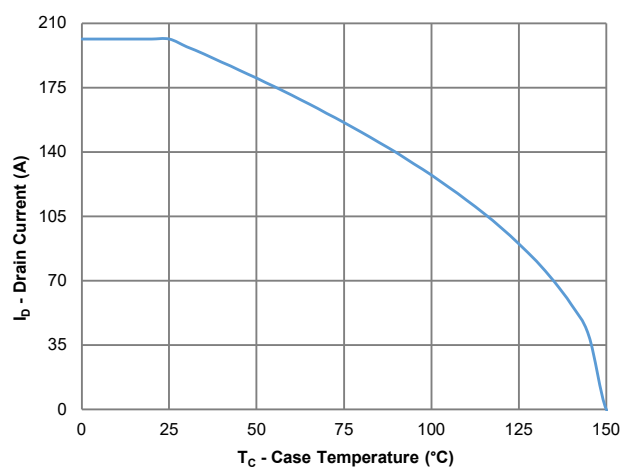


Figure 11: Current Derating

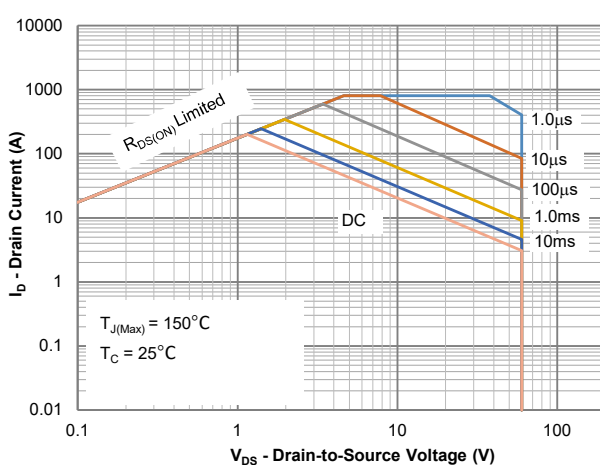
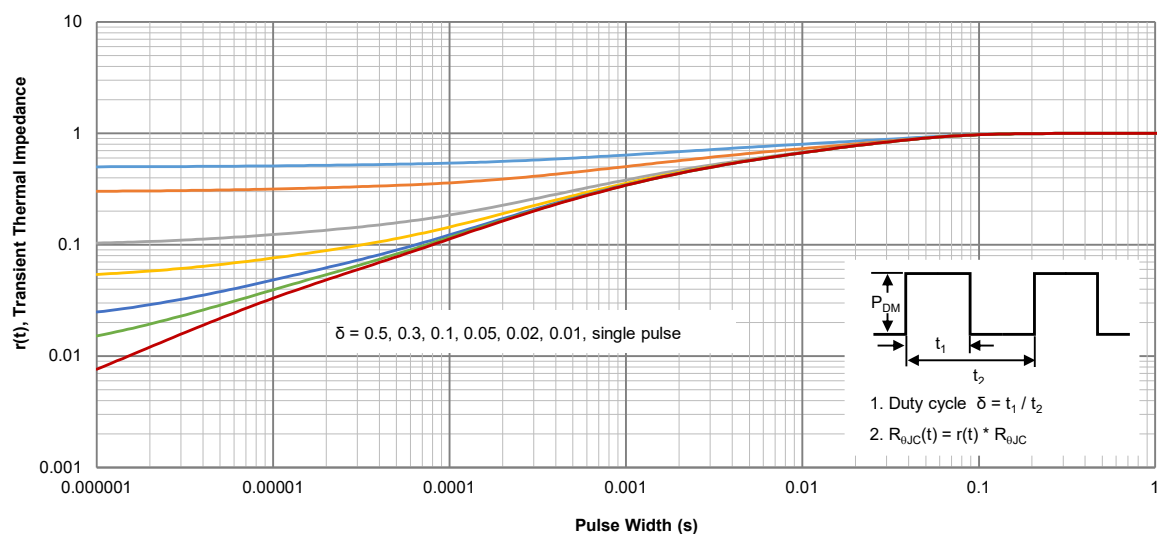
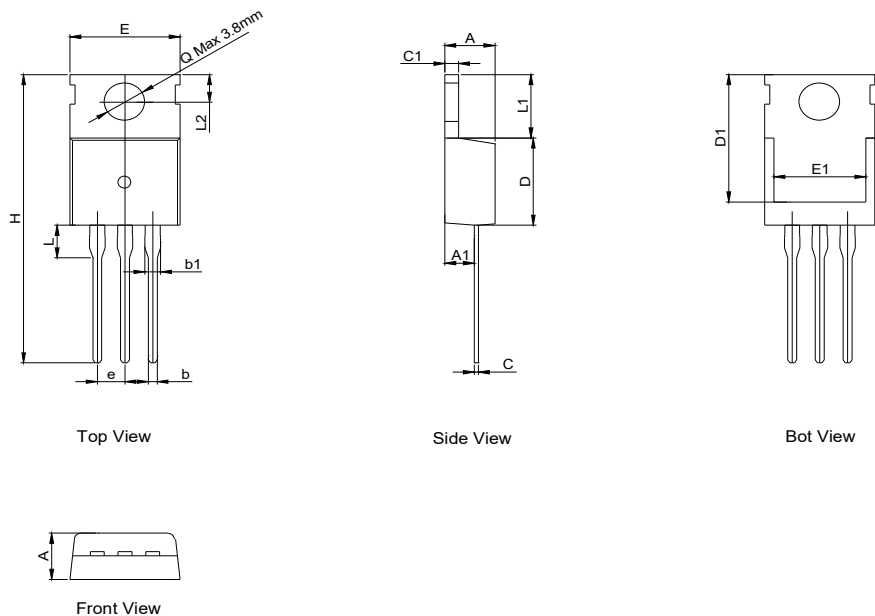


Figure 12: Safe Operating Area

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	4.24	4.50	4.70
A1	2.20	2.30	3.00
b	0.70	0.80	0.95
b1	1.10	1.30	1.70
C	0.40	0.50	0.60
C1	1.15	1.30	1.40
H	28.00	28.80	29.80
D	8.80	9.21	9.90
D1	12.43	13.20	13.60
E	9.70	10.00	10.50
E1	6.86	8.00	8.90
L	--	--	4.00
L1	6.25	6.50	6.90
L2	2.40	2.90	3.05
e	2.54 BSC		