

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	$I_D$
60V	1.1mΩ@10V	300A

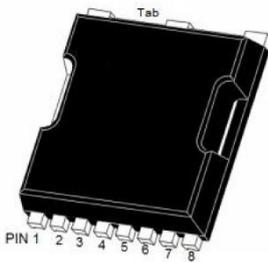
## Feature

- Ultra-low on-resistance and gate-charge
- Advanced shielded-gate technology

## Application

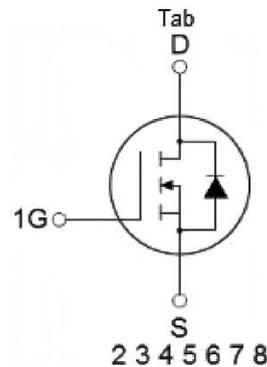
- PWM Application
- Hard switched and high frequency circuits
- Power management

## Package

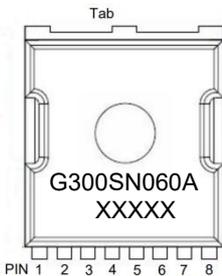


TOLL

## Circuit diagram



## Marking



### Absolute maximum ratings ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current (Package Limited)	$I_D$	300	A
Continuous Drain Current ( $T_C=25^\circ\text{C}$ , Silicon Limited)	$I_D$	375	A
Continuous Drain Current ( $T_C=125^\circ\text{C}$ , Silicon Limited)	$I_{D(125^\circ\text{C})}$	217	A
Pulsed Drain Current <sup>1)</sup> ( $T_C=25^\circ\text{C}$ , $t_p=10\mu\text{s}$ )	$I_{DM}$	1200	A
Single Pulse Avalanche Energy <sup>2)</sup>	$E_{AS}$	700	mJ
Power Dissipation	$P_D$	375	W
Thermal Resistance Junction to Case	$R_{\theta JC}$	0.4	$^\circ\text{C/W}$
Operating Junction Temperature	$T_J$	-55 ~ +175	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-55 ~ +175	$^\circ\text{C}$

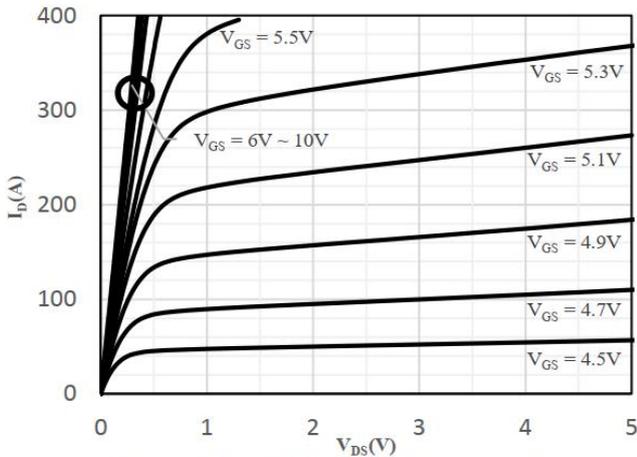
### Electrical characteristics ( $T_J=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{V}$ , $I_D=1\text{mA}$	60			V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=60\text{V}$ , $V_{GS}=0\text{V}$			1	$\mu\text{A}$
Gate-body leakage current	$I_{GSS}$	$V_{DS}=0\text{V}$ , $V_{GS}=\pm 20\text{V}$			$\pm 100$	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	2	3	4	V
Drain-source on-resistance <sup>1)</sup>	$R_{DS(on)}$	$V_{GS}=10\text{V}$ , $I_D=80\text{A}$		0.78	1.1	$\text{m}\Omega$
<b>Dynamic characteristics<sup>3)</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS}=30\text{V}$ , $V_{GS}=0\text{V}$ $f=1\text{MHz}$		15758		pF
Output Capacitance	$C_{oss}$			5461		
Reverse Transfer Capacitance	$C_{rss}$			177		
Total Gate Charge	$Q_g$	$V_{DS}=48\text{V}$ , $V_{GS}=10\text{V}$ , $I_D=80\text{A}$		230		nC
Gate-Source Charge	$Q_{gs}$			70		
Gate-Drain Charge	$Q_{gd}$			50		
Turn-on delay time	$t_{d(on)}$	$V_{DS}=30\text{V}$ , $V_{GS}=10\text{V}$ $I_D=100\text{A}$ , $R_G=1.8\Omega$		16		nS
Turn-on rise time	$t_r$			27		
Turn-off delay time	$t_{d(off)}$			48		
Turn-off fall time	$t_f$			23		
<b>Source-Drain Diode characteristics</b>						
Diode Forward Current	$I_S$				300	A
Diode Forward voltage	$V_{SD}$	$V_{GS}=0\text{V}$ , $I_S=80\text{A}$			1.2	V
Reverse Recovery Time	$T_{rr}$	$V_{GS}=0\text{V}$ , $I_F=40\text{A}$ $di/dt=-100\text{A}/\mu\text{s}$		118		nS
Reverse Recovery Charge	$Q_{rr}$			350		nC

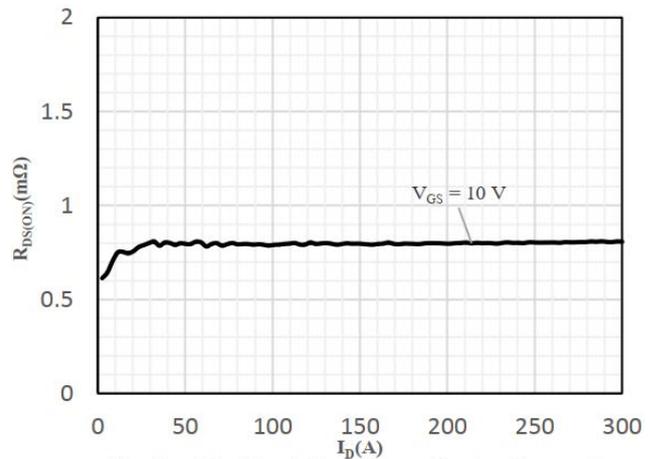
Notes:

- 1) The data tested by pulsed, pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- 2) The EAS data shows Max. rating. The test condition is  $V_{DD}=40\text{V}$ ,  $V_{GS}=10\text{V}$ ,  $L=1\text{mH}$ .
- 3) Guaranteed by design, not subject to production.

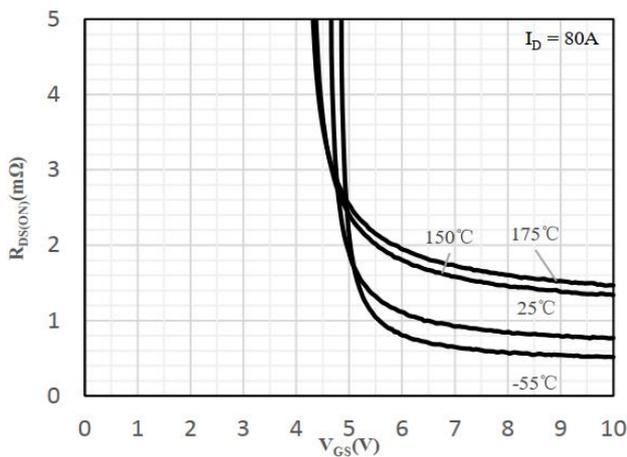
## Typical Characteristics



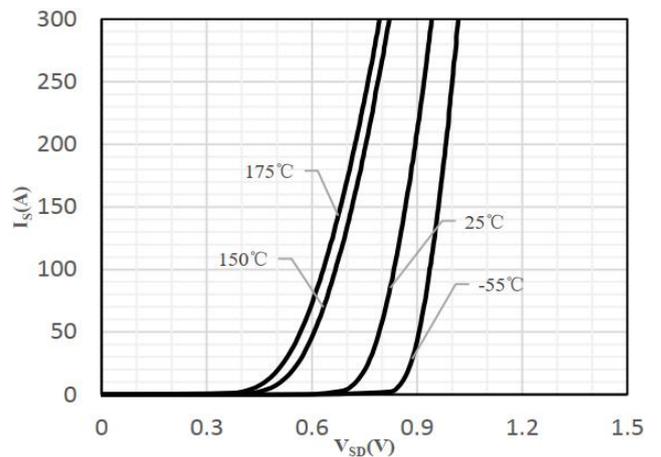
**Fig 1 Typical Output Characteristics**



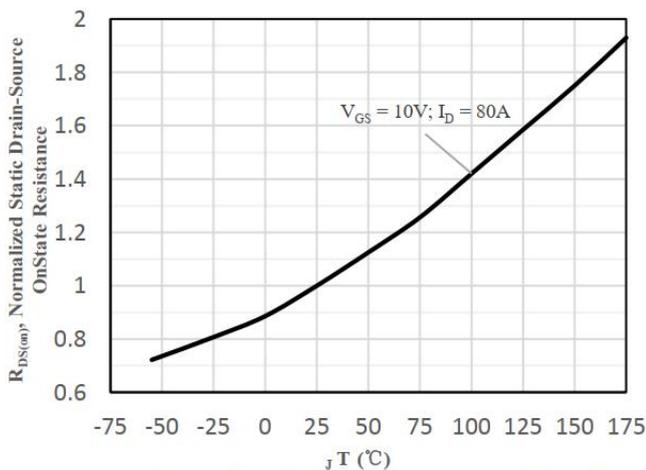
**Fig 2 On-Resistance vs. Drain Current and Gate Voltage**



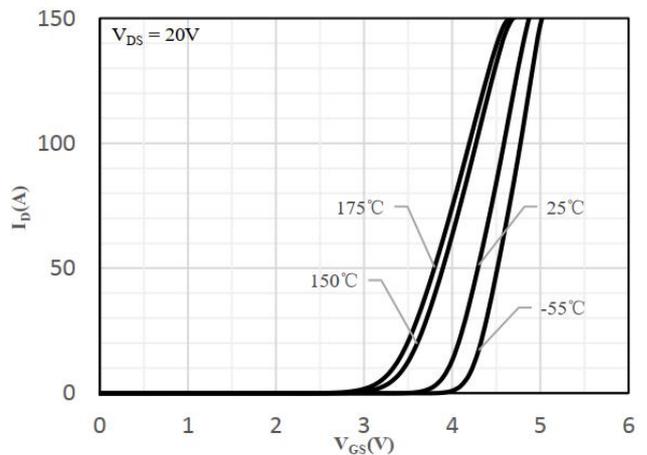
**Fig 3 On-Resistance vs. Gate-Source Voltage**



**Fig 4 Body-Diode Characteristics**

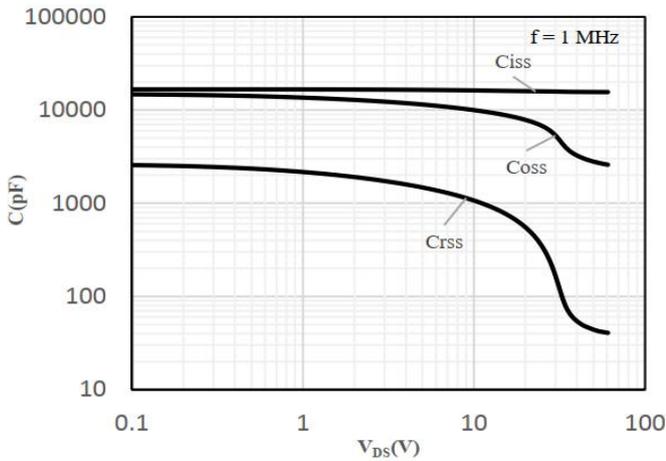


**Fig 5 Normalized On-Resistance vs. Junction Temperature**

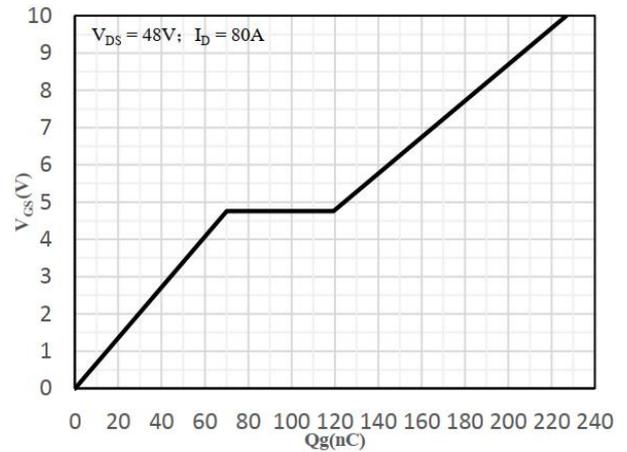


**Fig 6 Transfer Characteristics**

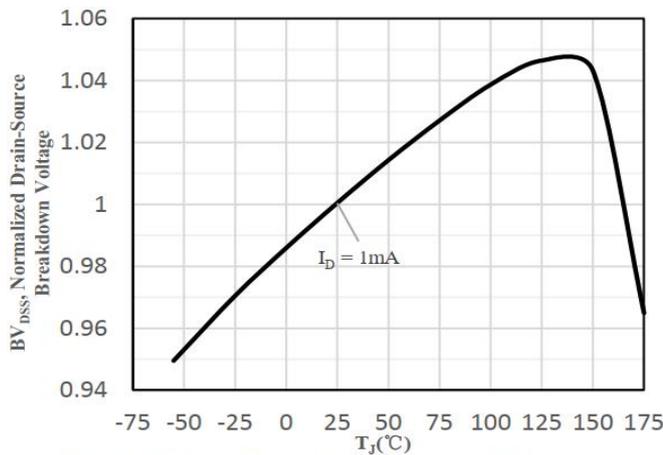
## Typical Characteristics



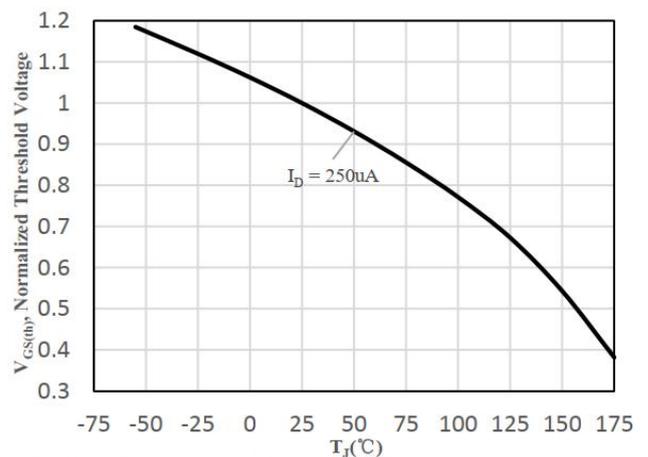
**Fig 7 Capacitance Characteristics**



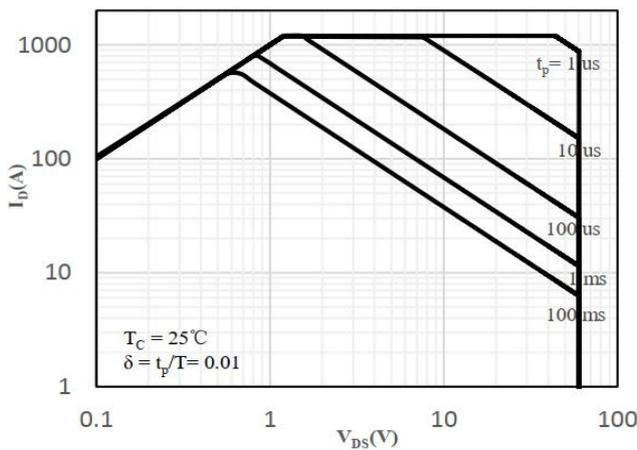
**Fig 8 Gate-Charge Characteristics**



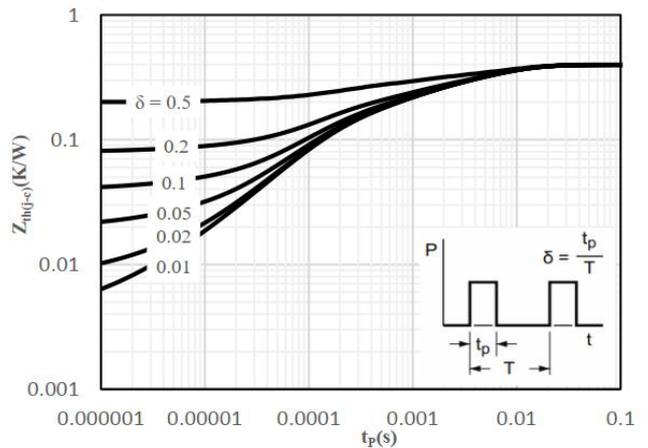
**Fig 9 Normalized Breakdown Voltage vs. Junction Temperature**



**Fig 10 Normalized  $V_{GS(th)}$  vs. Junction Temperature**

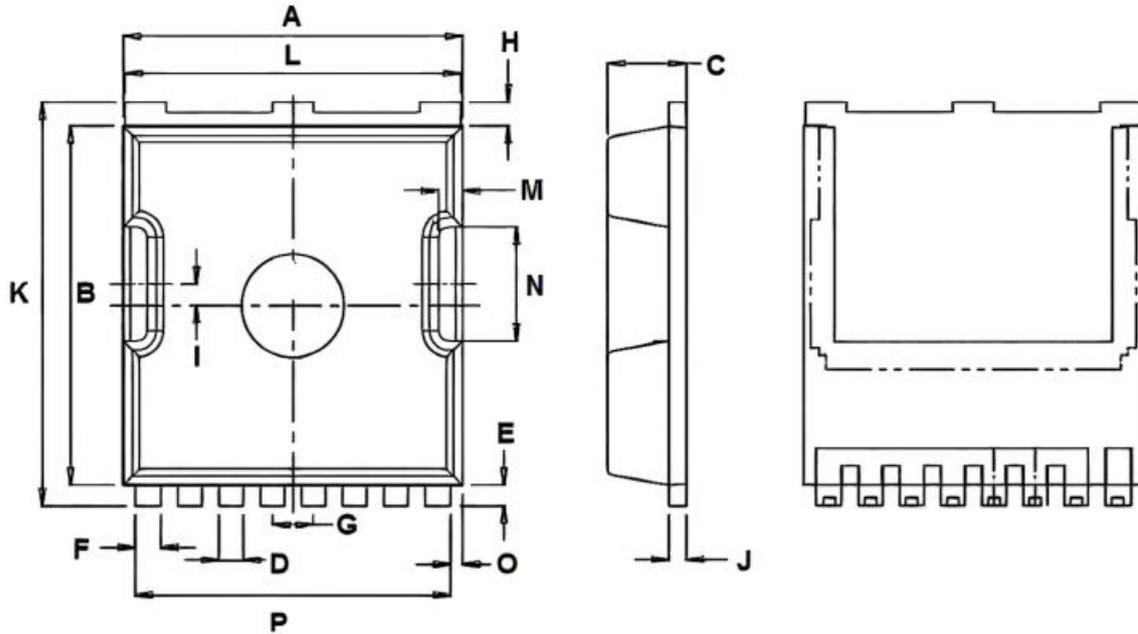


**Fig 11 Safe Operation Area**



**Fig 12 Maximum transient thermal impedance**

## TOLL Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	9.700	10.100	0.382	0.398
B	10.200	10.600	0.402	0.417
C	2.100	2.500	0.083	0.098
D	0.600	0.800	0.024	0.031
E	0.500	0.700	0.020	0.028
F	0.650	0.850	0.026	0.033
G	1.100	1.300	0.043	0.051
H	0.600	0.800	0.024	0.031
I	0.550	0.750	0.022	0.030
J	0.450	0.550	0.018	0.022
K	11.500	11.900	0.453	0.469
L	9.600	10.000	0.378	0.394
M	0.500	0.700	0.020	0.028
N	3.100	3.500	0.122	0.138
O	0.250	0.450	0.010	0.018
P	9.000	9.400	0.354	0.370