

Product Summary

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

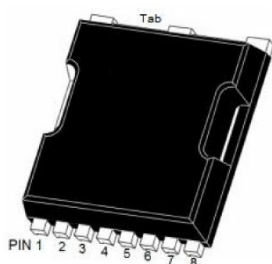
Feature

- Ultra-low on-resistance and gate-charge
- Advanced shielded-gate technology
- Suffix "-Q1" for AEC-Q101

Application

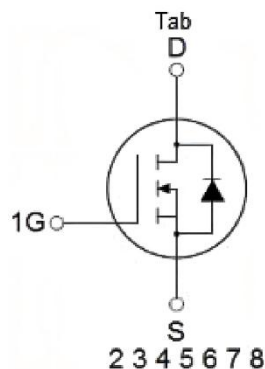
- PWM Application
- Hard switched and high frequency circuits
- Power management

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}	± 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 ¹⁾ ($T_C=25^{\circ}\text{C}$, $t_p=10\mu\text{s}$)	I_{DM}	1200	A
Single Pulse Avalanche Energy ²⁾	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	$-55 \sim +175$	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	$-55 \sim +175$	$^{\circ}\text{C}$

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

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =1mA	60			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =60V, V _{GS} =0V			1	μA
Gate-body leakage current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±100	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2	3	4	V
Drain-source on-resistance ¹⁾	R _{DS(on)}	V _{GS} =10V, I _D =80A		0.78	1.1	mΩ
Dynamic characteristics ³⁾						
Input Capacitance	C _{iss}	V _{DS} =30V, V _{GS} =0V f =1MHz		15758		pF
Output Capacitance	C _{oss}			5461		
Reverse Transfer Capacitance	C _{rss}			177		
Total Gate Charge	Q _g	V _{DS} =48V, V _{GS} =10V, I _D =80A		230		nC
Gate-Source Charge	Q _{gs}			70		
Gate-Drain Charge	Q _{gd}			50		
Turn-on delay time	t _{d(on)}	V _{DS} =30V, V _{GS} =10V I _D =100A, R _G =1.8Ω		16		nS
Turn-on rise time	t _r			27		
Turn-off delay time	t _{d(off)}			48		
Turn-off fall time	t _f			23		
Source-Drain Diode characteristics						
Diode Forward Current	I _S				300	A
Diode Forward voltage	V _{SD}	V _{GS} =0V, I _S =80A			1.2	V
Reverse Recovery Time	T _{rr}	V _{GS} =0V, I _F =40A		118		nS
Reverse Recovery Charge	Q _{rr}	di/dt =-100A/μs		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

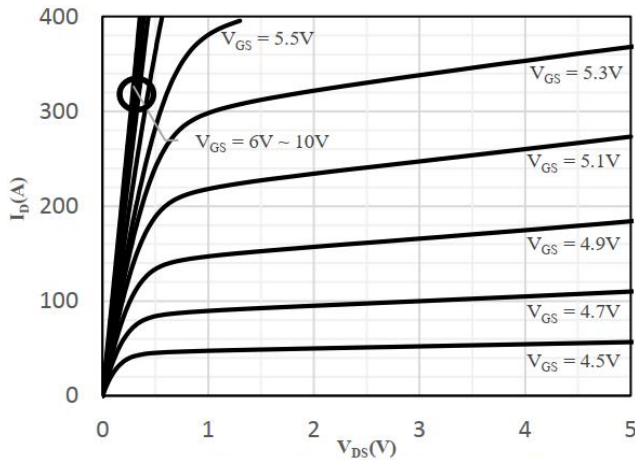


Fig 1 Typical Output Characteristics

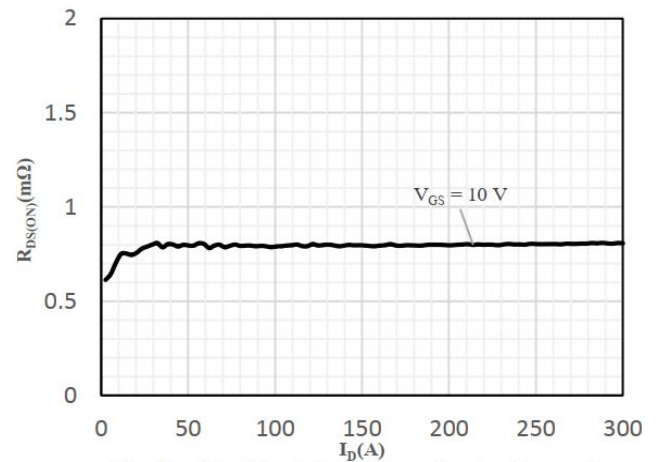


Fig 2 On-Resistance vs. Drain Current and Gate Voltage

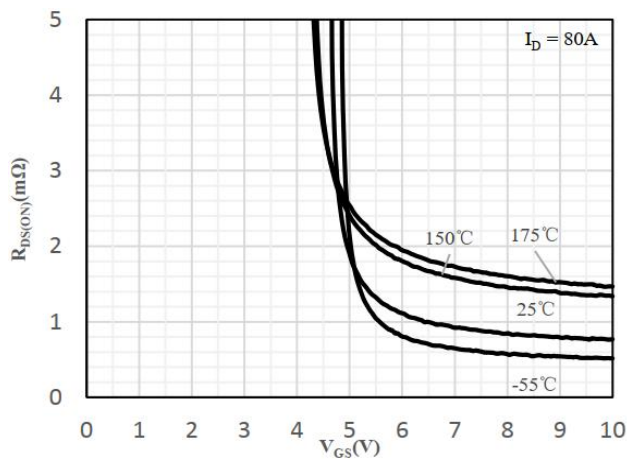


Fig 3 On-Resistance vs. Gate-Source Voltage

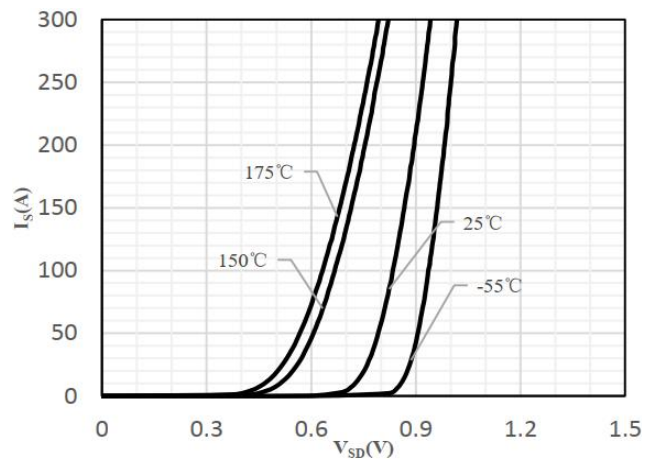


Fig 4 Body-Diode Characteristics

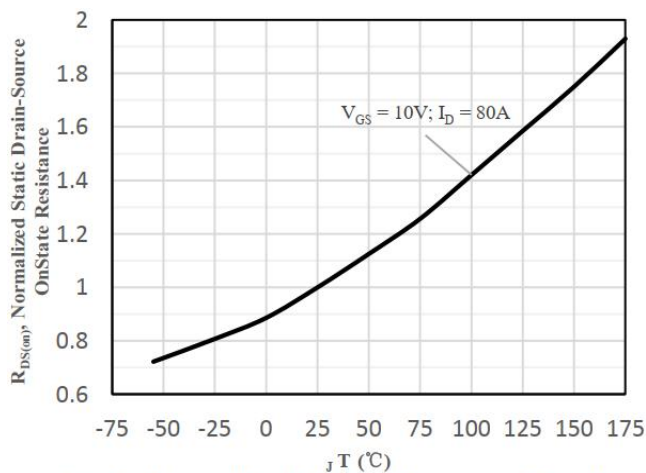


Fig 5 Normalized On-Resistance vs. Junction Temperature

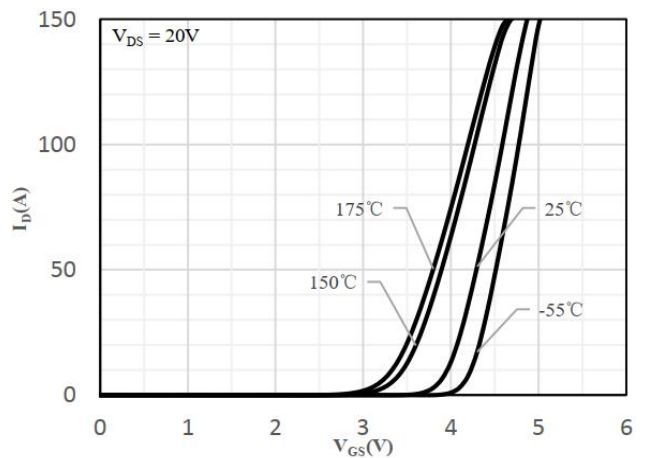


Fig 6 Transfer Characteristics

Typical Characteristics

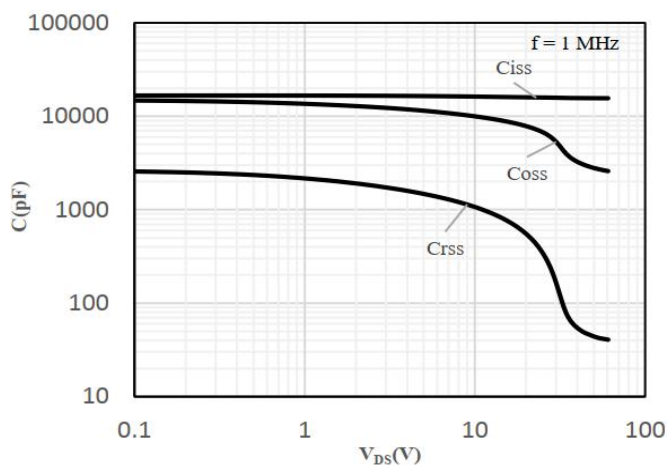


Fig 7 Capacitance Characteristics

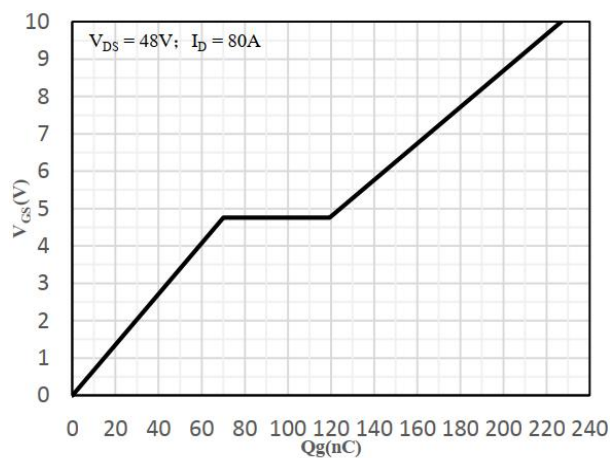


Fig 8 Gate-Charge Characteristics

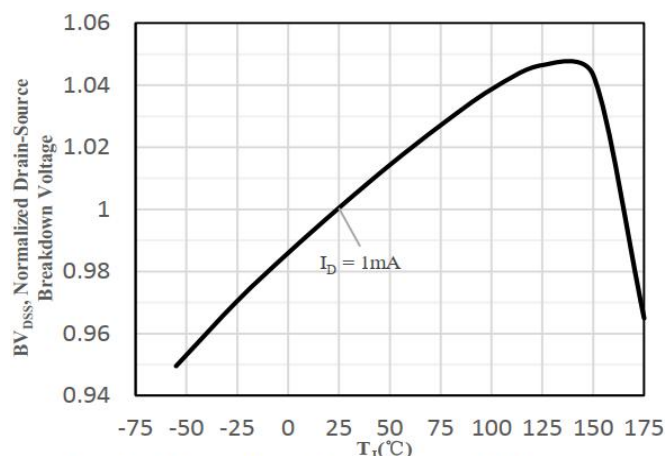


Fig 9 Normalized Breakdown Voltage vs. Junction Temperature

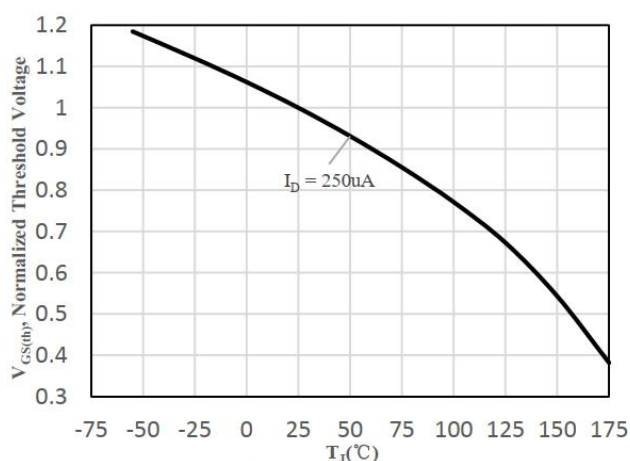


Fig 10 Normalized $V_{GS(th)}$ vs. Junction Temperature

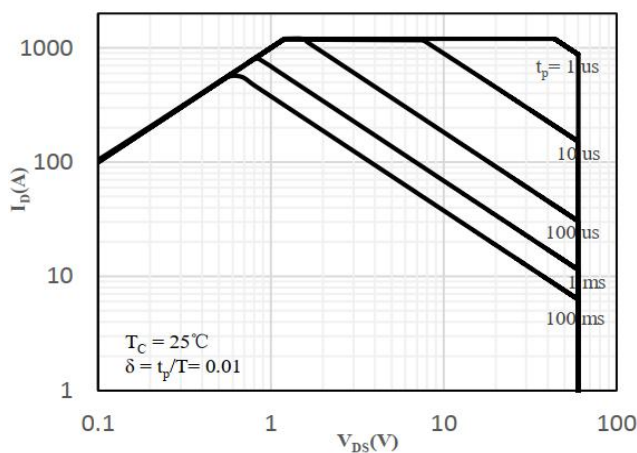


Fig 11 Safe Operation Area

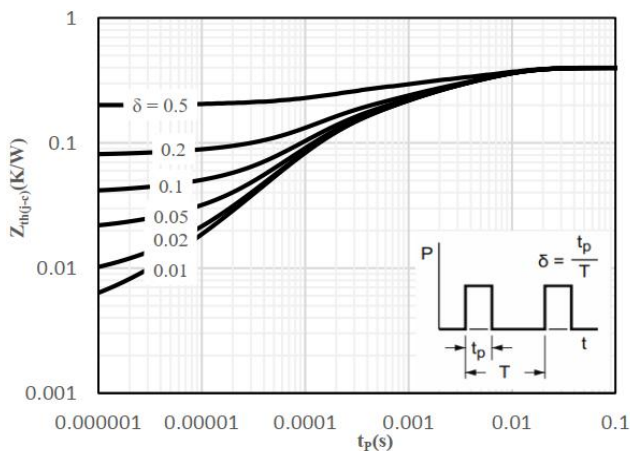
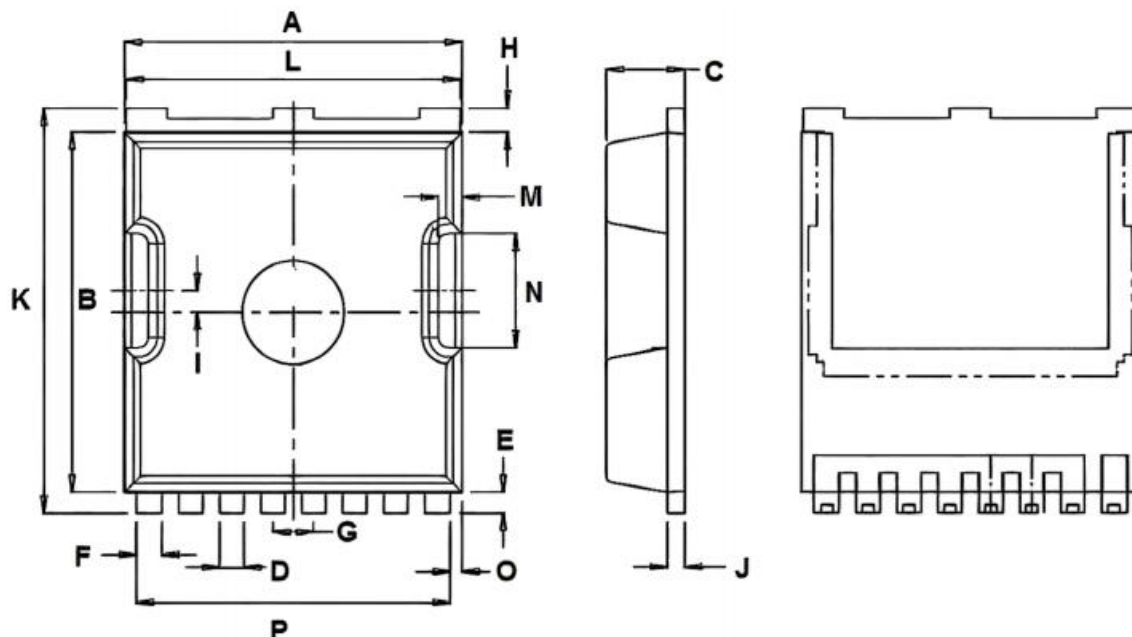


Fig 12 Maximum transient thermal impedance

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