

40V N-Channel Mosfet

FEATURES

- $R_{DS(ON)} \leq 1.4 \text{ m}\Omega$ (1.2 m Ω Typ.) @ $V_{GS}=10\text{V}$
- $R_{DS(ON)} \leq 2.2 \text{ m}\Omega$ (1.68 m Ω Typ.) @ $V_{GS}=4.5\text{V}$
- AEC Q101 qualified
- Green Product (RoHS compliant)
- 100% UIS TEST

APPLICATIONS

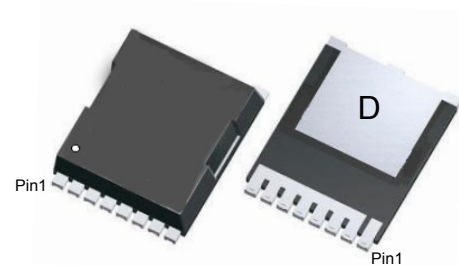
- Automotive power
- PWM Applications
- Load Switch
- Power Management

MARKING



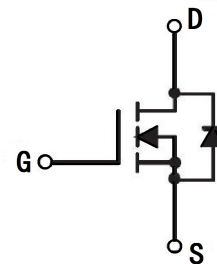
YYMM:Date Code(year & month)

TOLL



1: G 3: S 5: S 7: S
2: S 4: S 6: S 8: S

N-CHANNEL MOSFET



Absolute Maximum Ratings ($T_c=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Max.	Units	
V_{DSS}	Drain-Source Voltage	40	V	
V_{GSS}	Gate-Source Voltage	± 20	V	
I_D	Continuous Drain Current @ $V_{GS}=10\text{V}$	$T_c = 25^\circ\text{C}$	300	A
		$T_c = 100^\circ\text{C}$	210	A
I_{DM}	Pulsed Drain Current ^{note1}	900	A	
E_{AS}	Single Pulsed Avalanche Energy ^{note2}	1200	mJ	
P_D	Power Dissipation	$T_c = 25^\circ\text{C}$	250	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.6	$^\circ\text{C}/\text{W}$	
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +175	$^\circ\text{C}$	

Electrical Characteristics (T_c=25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =40V, V _{GS} =0V,	-	-	1.0	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} =±20V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.0	1.5	2.5	V
R _{DS(on)}	Static Drain-Source on-Resistance <small>note3</small>	V _{GS} =10V, I _D =30A	-	1.2	1.4	mΩ
		V _{GS} =4.5V, I _D =20A	-	1.68	2.2	
Dynamic Characteristics <small>note4</small>						
C _{iss}	Input Capacitance	V _{DS} =20V, V _{GS} =0V, f=1.0MHz	-	7200	-	pF
C _{OSS}	Output Capacitance		-	2032	-	pF
C _{rss}	Reverse Transfer Capacitance		-	118	-	pF
Q _g	Total Gate Charge	V _{DS} =20V, I _D =20A, V _{GS} =10V	-	120	-	nC
Q _{gs}	Gate-Source Charge		-	12.6	-	nC
Q _{gd}	Gate-Drain("Miller") charge		-	36.7	-	nC
Switching Characteristics <small>note4</small>						
t _{d(on)}	Turn-on Delay Time	V _{DD} =20V, I _D =25A, R _{GEN} =6Ω, V _{GS} =10V	-	27.3	-	ns
t _r	Turn-on Rise Time		-	29.8	-	ns
t _{d(off)}	Turn-off Delay Time		-	75.7	-	ns
t _f	Turn-off Fall Time		-	19.5	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S =30A	-	-	1.2	V

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition T_J=25°C, V_{DD}=32V, V_G=10V, L=0.5mH, I_D=70A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

4. Guaranteed by design, not subject to production testing

Typical Performance Characteristics

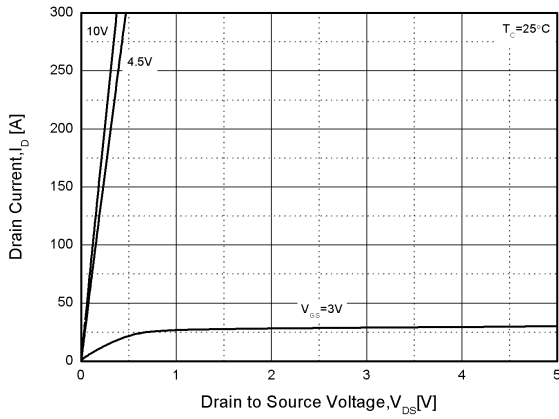


Figure1. Output Characteristics

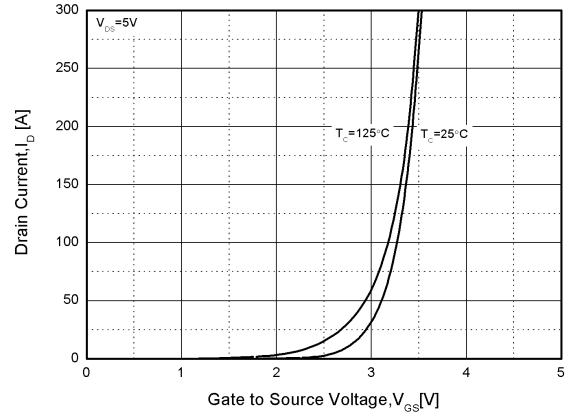


Figure2. Transfer Characteristics

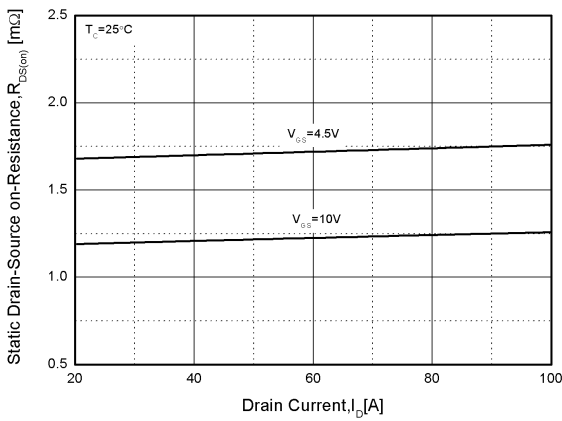


Figure3. Rdson-Drain Current

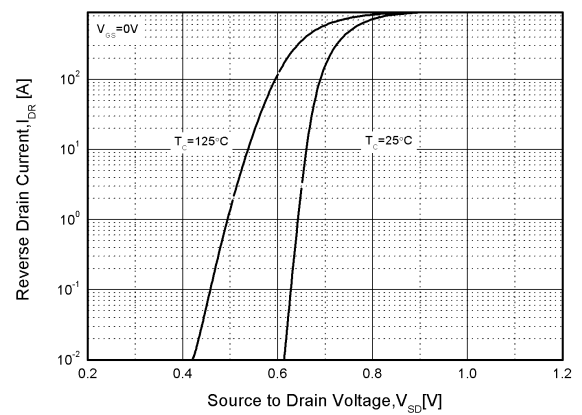


Figure4. Typical Source-Drain Diode Forward Voltage

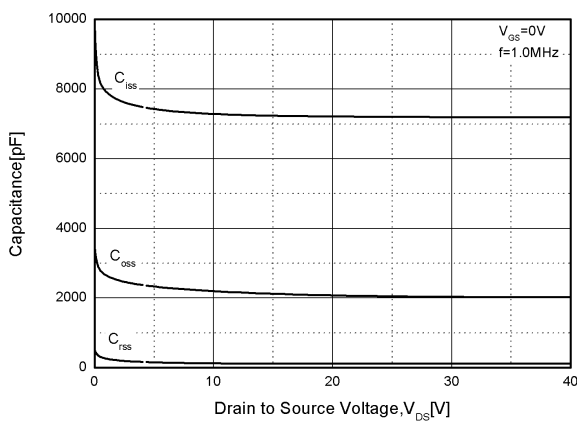


Figure5. Capacitance Characteristics

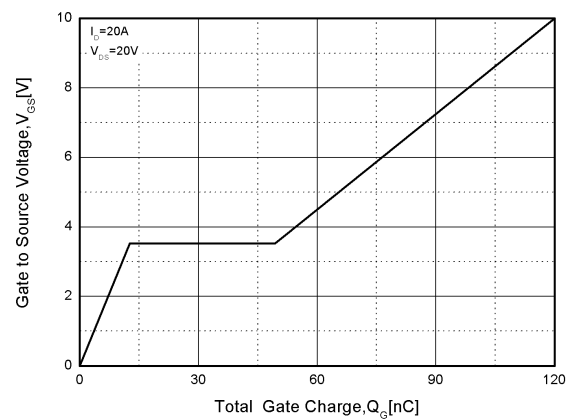


Figure6. Gate Charge

Typical Performance Characteristics (cont.)

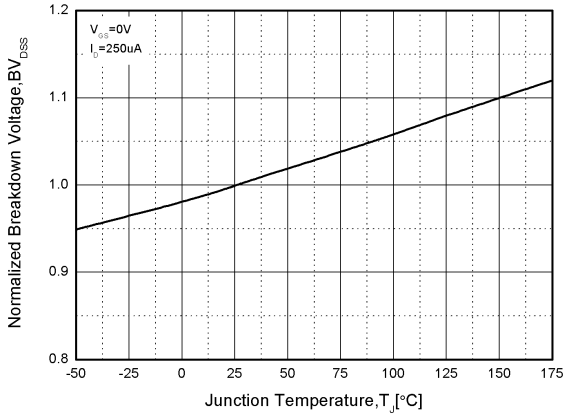


Figure7. Normalized Breakdown Voltage vs. Temperature

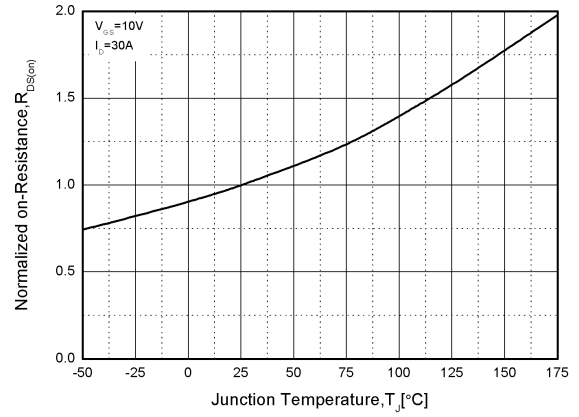


Figure8. Normalized on Resistance vs. Temperature

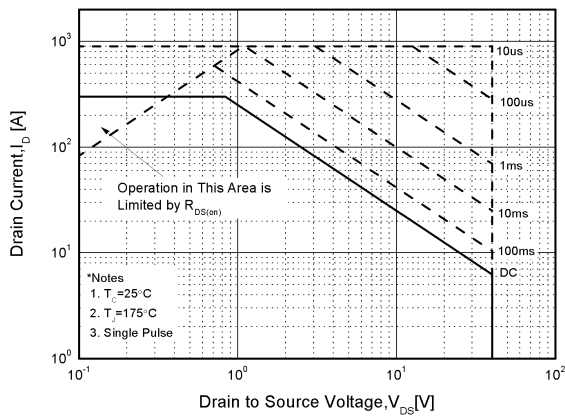


Figure9. Safe Operation Area

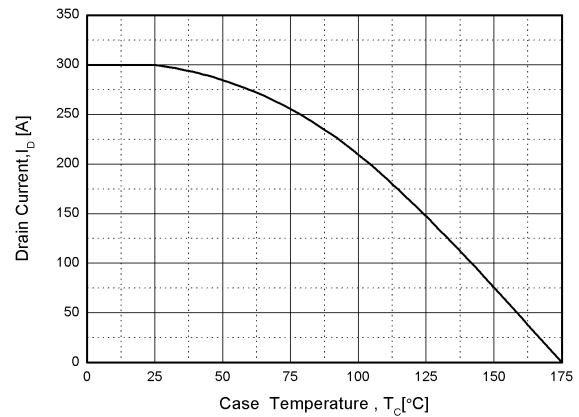


Figure10. Drain Current vs. Case Temperature

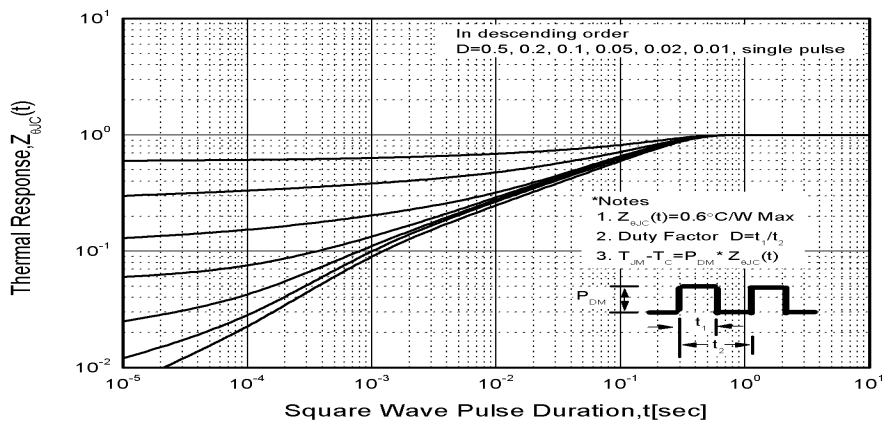
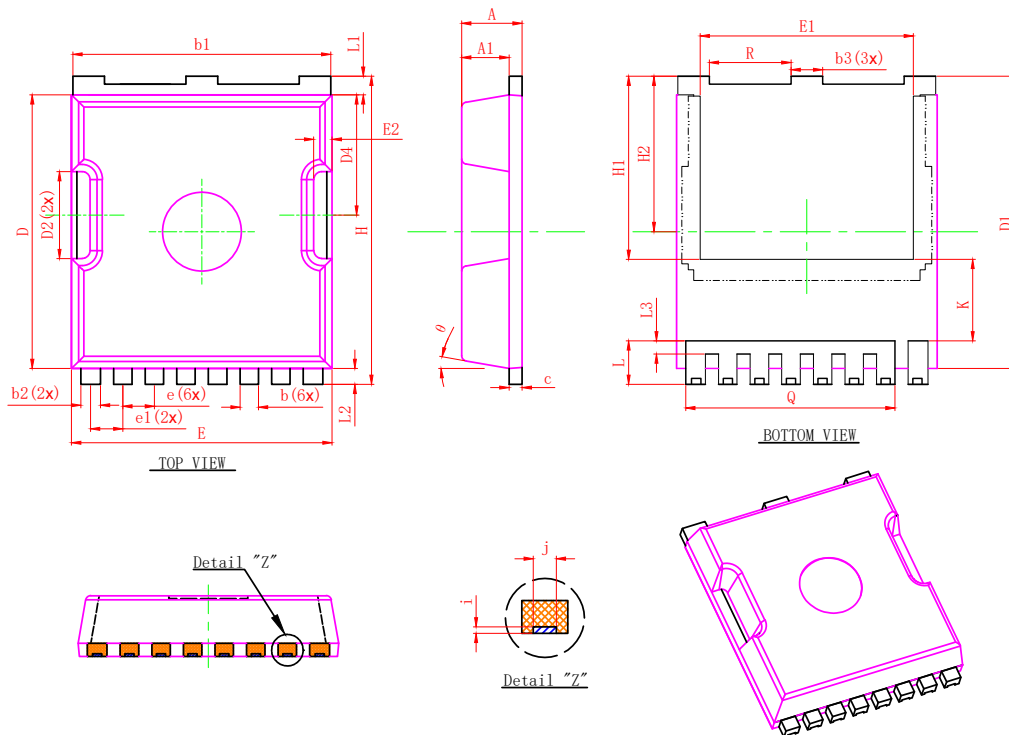


Figure11. Transient Thermal Response Curve

TOLL Package Outline Dimensions



SYMBOL	MILLIMETER		
	MIN.	NOM.	MAX.
A	2.200	2.300	2.400
A1	1.700	1.800	1.900
b	0.600	0.700	0.800
b1	9.700	9.800	9.900
b2	0.650	0.750	0.850
b3	1.100	1.200	1.300
c	0.400	0.500	0.600
D	10.300	10.400	10.500
D1	11.000	11.100	11.200
D2	3.200	3.300	3.400
D4	4.470	4.570	4.670
E	9.800	9.900	10.000
E1	8.000	8.100	8.200
E2	0.500	0.600	0.700
e	1.200 BSC		
e1	1.225 BSC		
H	11.600	11.700	11.800
H1	6.950 BSC		
H2	5.900 BSC		
i	0.100 REF.		
j	0.350 REF.		
K	3.100 REF.		
L	1.550	1.650	1.750
L1	0.600	0.700	0.800
L2	0.500	0.600	0.700
L3	0.400	0.500	0.600
Q	7.950 REF.		
R	3.000	3.100	3.200
θ	10° REF.		