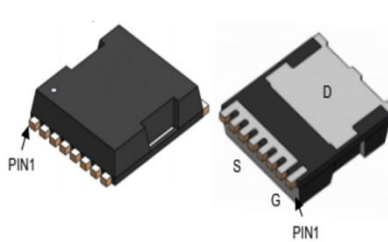
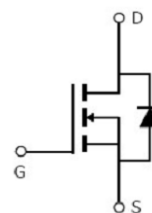


**Main Product Characteristics:**

$V_{DSS}$	40V
$R_{DS(on)}$	1.6m $\Omega$ (typ.)
$I_D$	180A


**TOLL**

**Schematic Diagram**
**Features and Benefits:**

- Advanced MOSFET process technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 150°C operating temperature


**Description:**

It utilizes the latest processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

**Absolute Max Rating:**

Symbol	Parameter	Max.	Units
$I_D @ T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$ ①	180	A
$I_D @ T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$ ①	107	
$I_{DM}$	Pulsed Drain Current ②	720	
$P_D @ T_C = 25^\circ\text{C}$	Power Dissipation ③	290	W
$V_{DS}$	Drain-Source Voltage	40	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$E_{AS}$	Single Pulse Avalanche Energy @ $L=0.3\text{mH}$	590	mJ
$T_J \quad T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

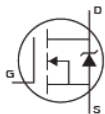
## Thermal Resistance

Symbol	Characterizes	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case ③	—	0.43	$^{\circ}\text{C}/\text{W}$

## Electrical Characteristics @ $T_A=25^{\circ}\text{C}$ unless otherwise specified

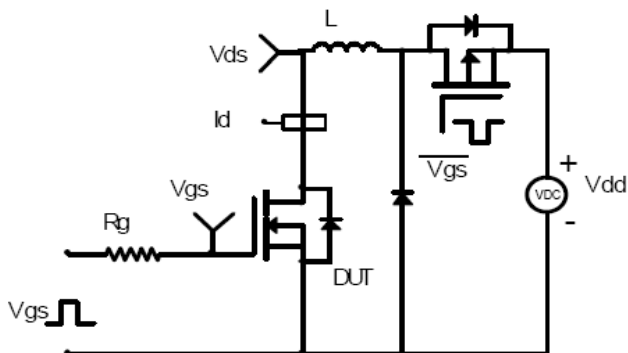
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	40	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	1.6	3	m $\Omega$	$V_{GS}=10\text{V}, I_D = 40\text{A}$
$V_{GS(th)}$	Gate threshold voltage	2	—	4	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
$I_{DSS}$	Drain-to-Source leakage current	—	—	1	$\mu\text{A}$	$V_{DS} = 40\text{V}, V_{GS} = 0\text{V}$
$I_{GSS}$	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS} = 20\text{V}$
		—	—	-100		$V_{GS} = -20\text{V}$
$C_{iss}$	Input capacitance	—	10547	—	pF	$V_{GS} = 0\text{V}$
$C_{oss}$	Output capacitance	—	654	—		$V_{DS} = 30\text{V}$
$C_{rss}$	Reverse transfer capacitance	—	553	—		$f = 1\text{MHz}$
$Q_g$	Total gate charge	—	135	—	nC	$I_D = 20\text{A},$
$Q_{gs}$	Gate-to-Source charge	—	25	—		$V_{DS}=20\text{V},$
$Q_{gd}$	Gate-to-Drain("Miller") charge	—	35	—		$V_{GS} = 10\text{V}$
$t_{d(on)}$	Turn-on delay time	—	32	—	ns	$V_{GS}=10\text{V}, V_{DD} = 20\text{V},$ $R_{GEN}=3.6\Omega, R_L=1\Omega$
$t_r$	Rise time	—	31	—		
$t_{d(off)}$	Turn-Off delay time	—	68	—		
$t_f$	Fall time	—	23	—		

## Source-Drain Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	180	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode)	—	—	720	A	
$V_{SD}$	Diode Forward Voltage	—	—	1.2	V	$I_S=40\text{A}, V_{GS}=0\text{V}$
$t_{rr}$	Reverse Recovery Time	—	50	—	ns	$T_J = 25^{\circ}\text{C}, I_F = 20\text{A}, di/dt = 100\text{A}/\mu\text{s}$
$Q_{rr}$	Reverse Recovery Charge	—	75	—	nC	

## Test Circuits and Waveforms

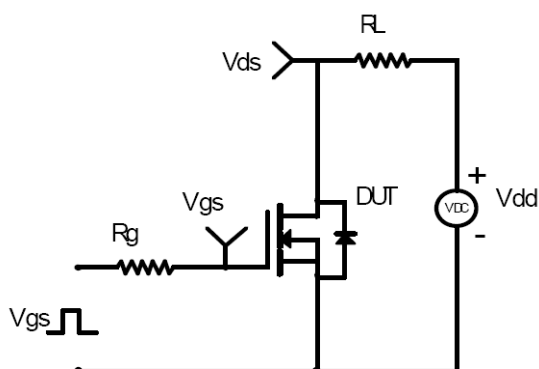
EAS Test Circuit:



Gate Charge Test Circuit:



Switching Time Test Circuit:



Switching Waveforms:



### Notes:

- ① Calculated continuous current based on maximum allowable junction temperature.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation  $P_D$  is based on max. junction temperature, using junction-to-case thermal resistance.

Typical Electrical and Thermal Characteristics

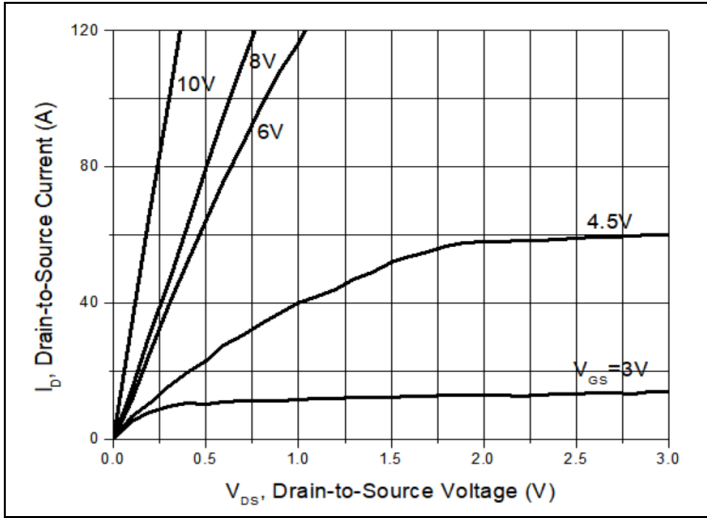


Figure1. Typical Output Characteristics

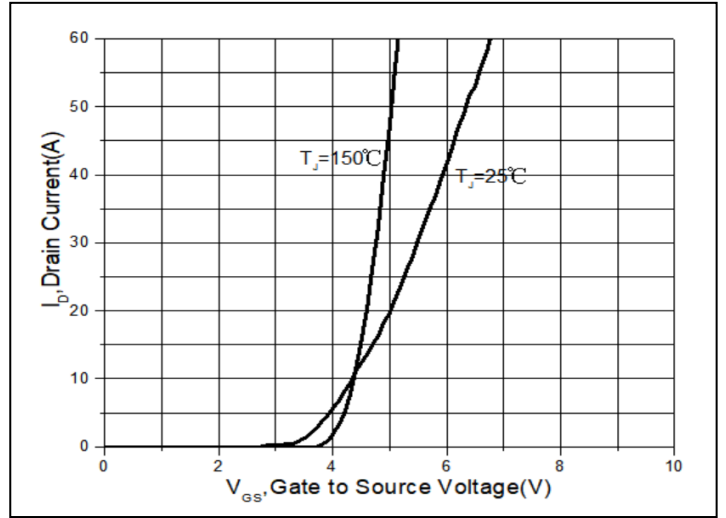


Figure2. Typical Transfer Characteristics

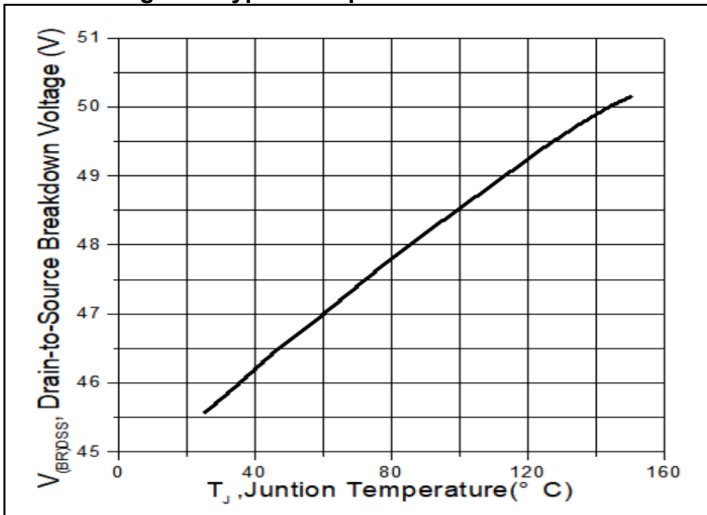


Figure3. Drain-to-Source Breakdown Voltage vs. Junction Temperature

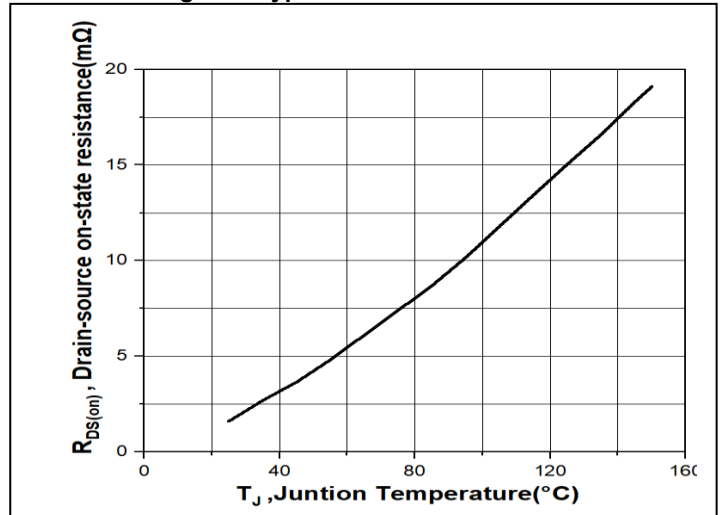


Figure4. Normalized On-Resistance vs. Junction Temperature

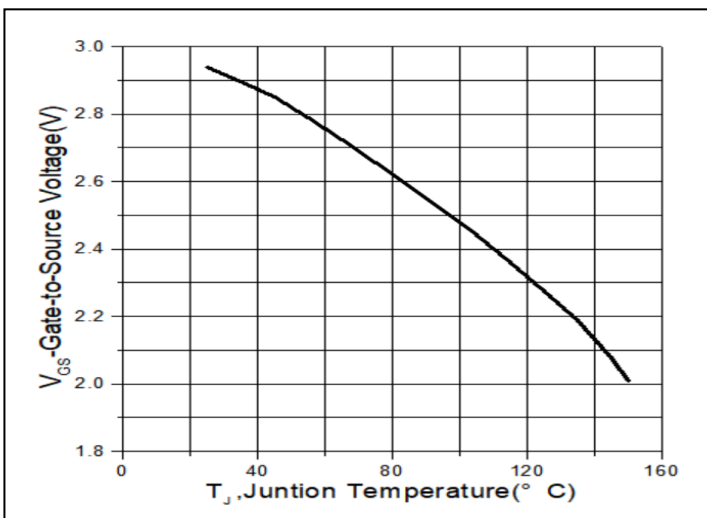


Figure5. Normalized  $V_{GS(th)}$  vs. Junction Temperature

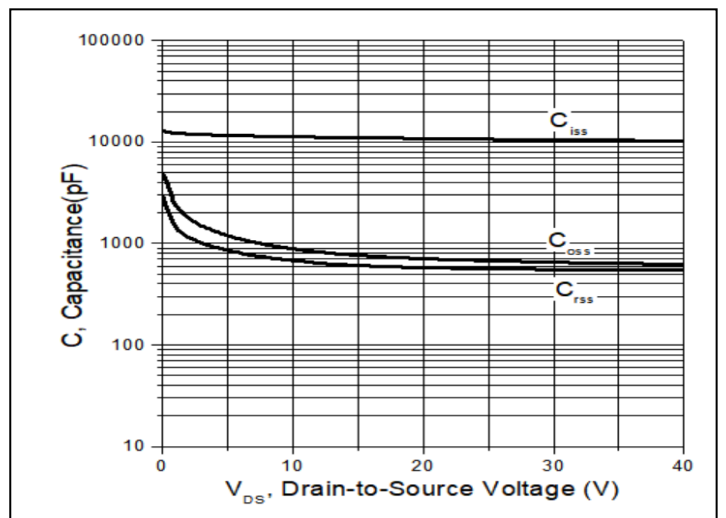
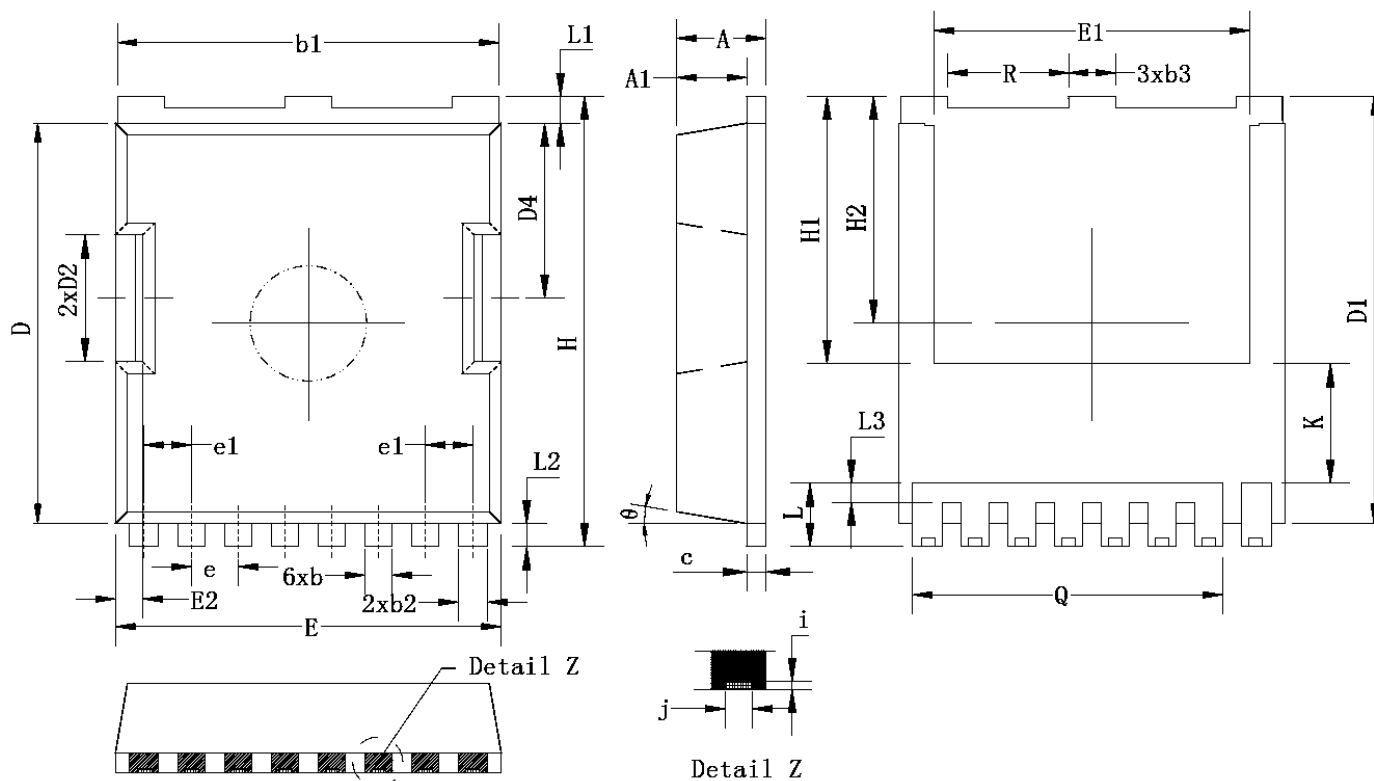


Figure6. Capacitance Characteristics

Mechanical Data:



Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	2.25	2.30	2.35	E2	0.65	0.70	0.75
A1	1.75	1.80	1.85	H	11.60	11.70	11.80
b	0.65	0.70	0.75	H1	6.95 BSC		
$b_1$	9.75	9.80	9.85	H2	5.90 BSC		
$b_2$	0.70	0.75	0.80	i	0.10 REF		
$b_3$	1.15	1.20	1.25	j	0.35 REF		
c	0.45	0.50	0.55	K	3.10 REF		
D	10.35	10.40	10.45	L	1.55	1.65	1.75
$D_1$	11.00	11.10	11.20	$L_1$	0.65	0.70	0.75
$D_2$	3.25	3.30	3.35	$L_2$	0.50	0.60	0.70
$D_4$	4.50	4.55	4.60	$L_3$	0.40	0.50	0.60
e	1.20 BSC			Q	7.95 REF		
$e_1$	1.225 BSC			R	3.05	3.10	3.15
E	9.85	9.90	9.95	$\theta$	10°REF		
$E_1$	8.00	8.10	8.20				

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