

### Description

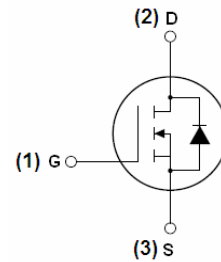
The G2009 uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

### General Features

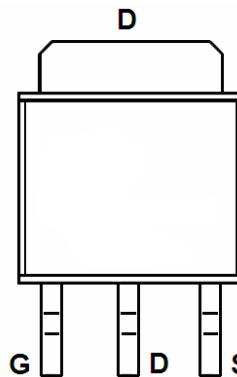
- $V_{DS} = 200V, I_D = 9A$   
 $R_{DS(ON)} < 300m\Omega @ V_{GS} = 10V$  (Typ: 260m $\Omega$ )
- High density cell design for ultra low  $R_{dson}$
- Fully characterized avalanche voltage and current
- Low gate to drain charge to reduce switching losses

### Application

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply



Schematic diagram



Marking and pin assignment



TO-251 top view

### Absolute Maximum Ratings ( $T_C = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	200	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	9	A
Drain Current-Continuous( $T_C = 100^\circ C$ )	$I_D(100^\circ C)$	5.6	A
Pulsed Drain Current	$I_{DM}$	20	A
Maximum Power Dissipation	$P_D$	55	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^\circ C$

### Thermal Characteristic

Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup>	$R_{\theta JC}$	2.3	$^\circ C/W$
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## Electrical Characteristics (T<sub>C</sub>=25°C unless otherwise noted)

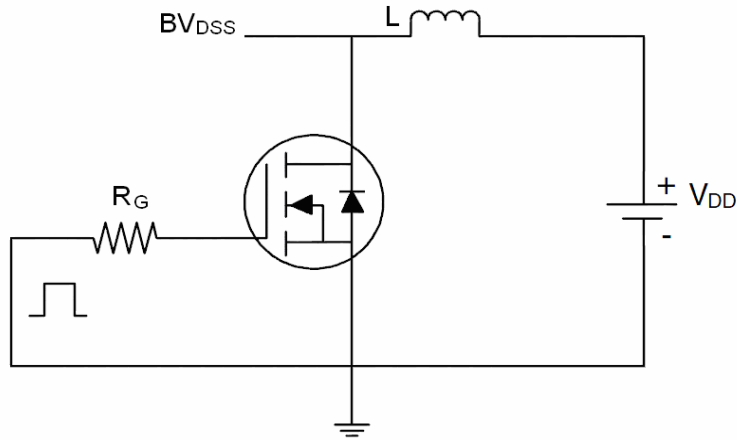
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V I <sub>D</sub> =250μA	200	215	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =200V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1	1.7	2.5	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =4.5A	-	260	300	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =25V, I <sub>D</sub> =4.5A	3	-	-	S
<b>Dynamic Characteristics</b> (Note 4)						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, F=1.0MHz		540		PF
Output Capacitance	C <sub>oss</sub>			90		PF
Reverse Transfer Capacitance	C <sub>rss</sub>			35		PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =100V, I <sub>D</sub> =4.5A V <sub>GS</sub> =10V, R <sub>GEN</sub> =5Ω	-	6.4	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	11	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	20	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	12	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =160V, I <sub>D</sub> =4.5A, V <sub>GS</sub> =10V	-	16	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	3.4	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	5.1	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =4.5A	-	-	1.2	V
Diode Forward Current (Note 2)	I <sub>S</sub>		-	-	9	A

### Notes:

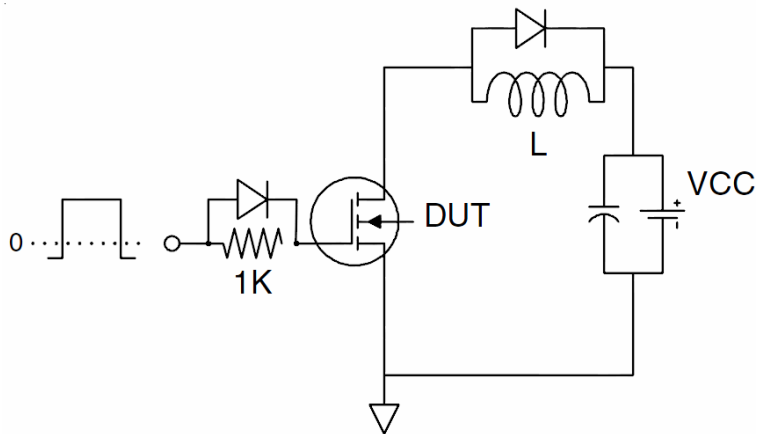
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production

**Test Circuit**

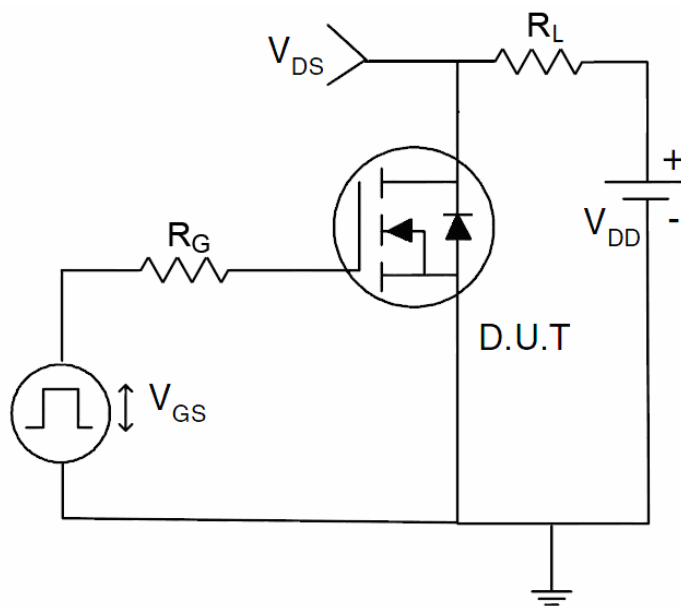
**1)  $E_{AS}$  test Circuit**



**2) Gate charge test Circuit**



**3) Switch Time Test Circuit**



Typical Electrical and Thermal Characteristics (Curves)

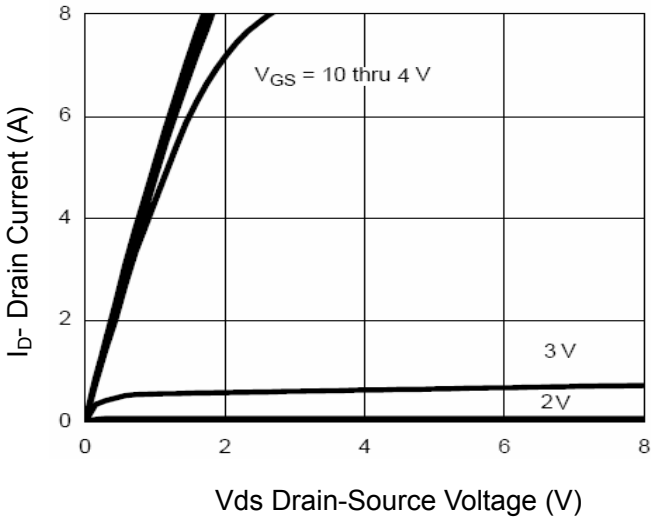


Figure 1 Output Characteristics

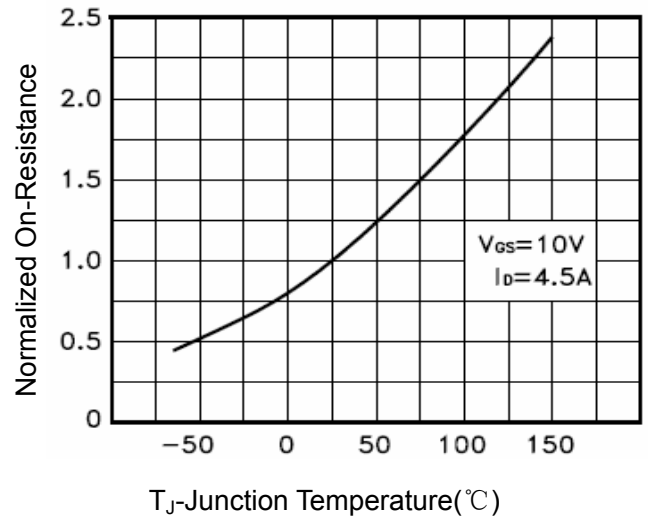


Figure 4 Rdson-Junction Temperature

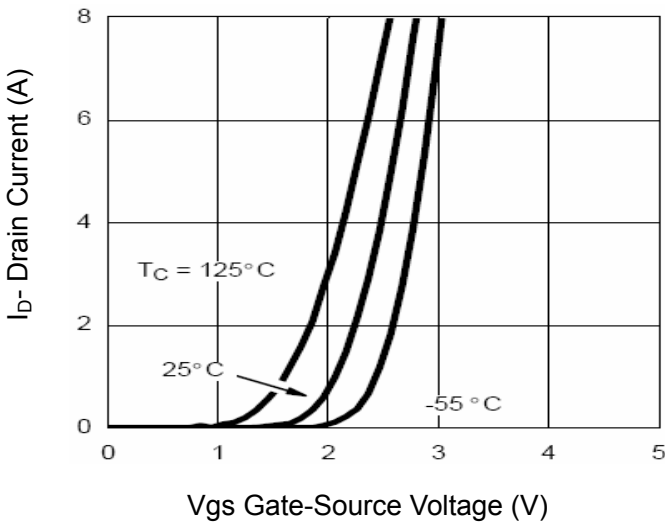


Figure 2 Transfer Characteristics

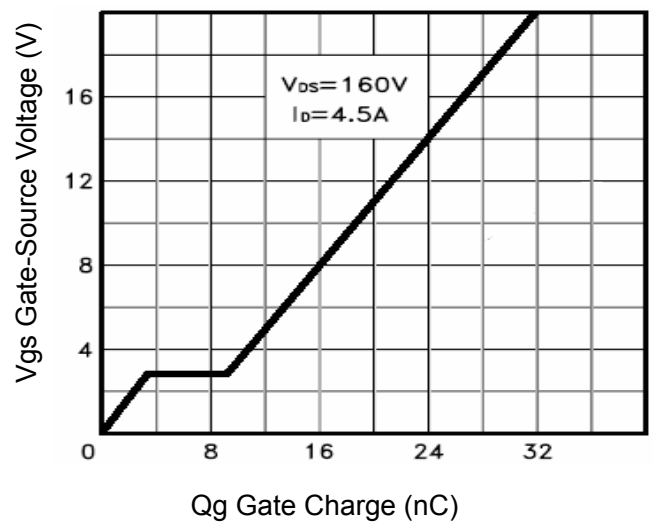


Figure 5 Gate Charge

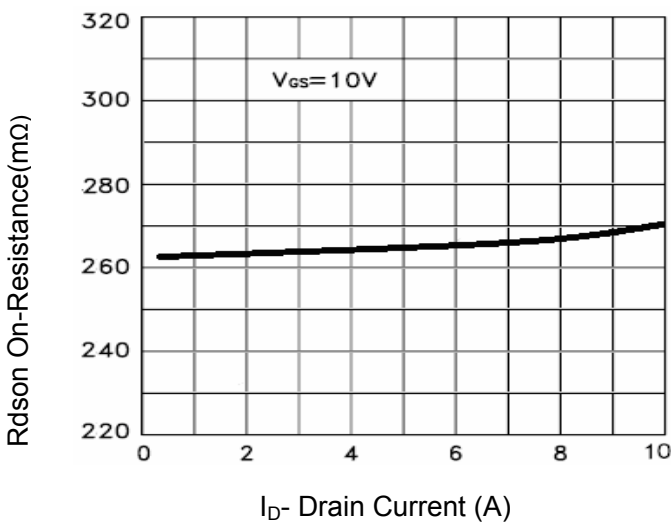


Figure 3 Rdson- Drain Current

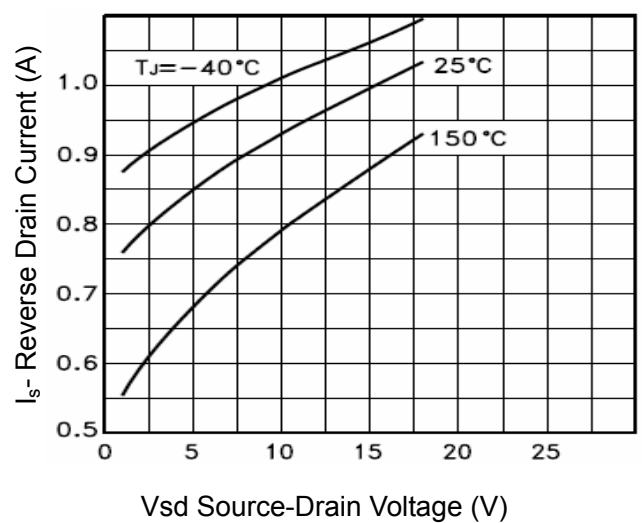


Figure 6 Source- Drain Diode Forward

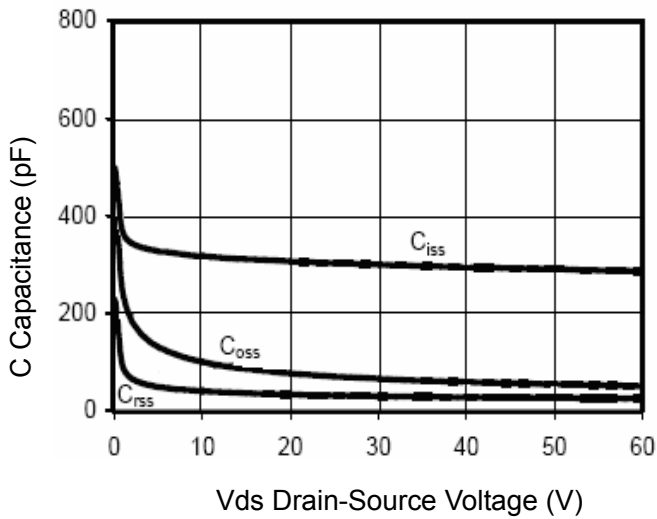


Figure 7 Capacitance vs Vds

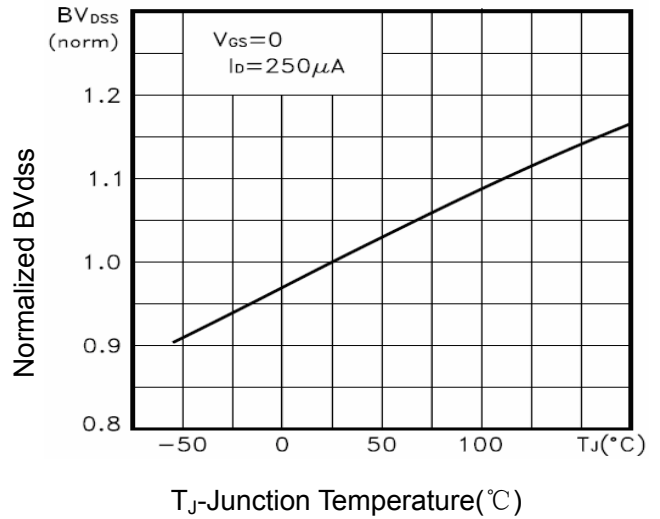


Figure 9  $BV_{DSS}$  vs Junction Temperature

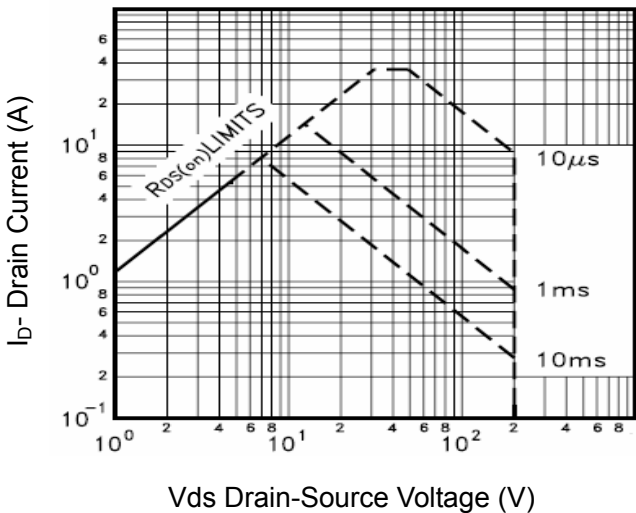


Figure 8 Safe Operation Area

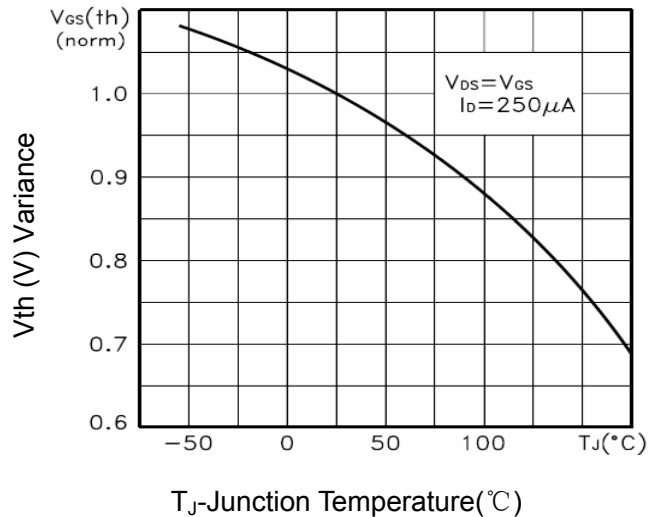


Figure 10  $V_{GS(th)}$  vs Junction Temperature

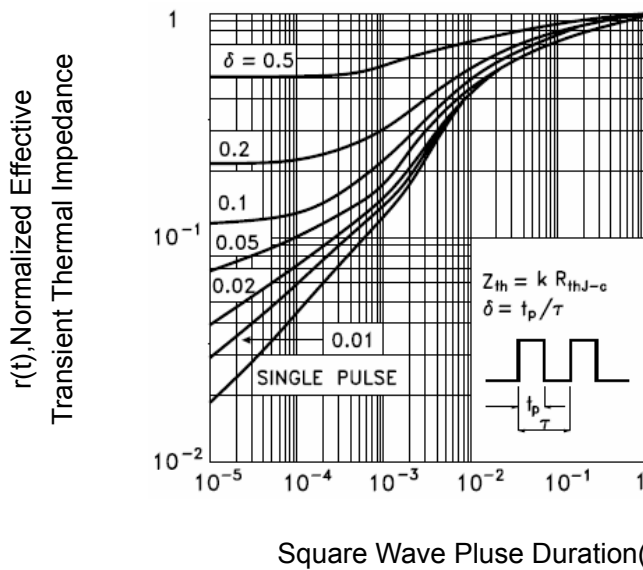


Figure 11 Normalized Maximum Transient Thermal Impedance