

**General Description**

The UI6008 is the highest performance trench N-ch MOSFETs with extreme high cell density, which provide excellent  $R_{DS(ON)}$  and gate charge for most of the synchronous buck converter applications.

The UI6008 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

**Features**

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent  $CdV/dt$  effect decline
- 100% EAS Guaranteed
- Green Device Available

**Absolute Maximum Ratings**

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	60	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	10	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	7	A
$I_D@T_A=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	3.4	A
$I_D@T_A=70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	2.7	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	20	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	10.7	mJ
$I_{AS}$	Avalanche Current	11.2	A
$P_D@T_C=25^\circ C$	Total Power Dissipation <sup>4</sup>	20.8	W
$P_D@T_A=25^\circ C$	Total Power Dissipation <sup>4</sup>	2	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

**Thermal Data**

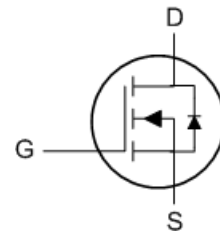
Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	---	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	6	$^\circ C/W$

**Product Summary**

$BV_{DSS}$	$R_{DS(ON)}$	ID
60V	90m $\Omega$	10A

**Applications**

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- Load Switch

**TO251 Pin Configuration**


**N-Ch 60V Fast Switching MOSFETs**
**Electrical Characteristics ( $T_J=25^\circ\text{C}$ , unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	60	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	$BV_{DSS}$ Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=1\text{mA}$	---	0.054	---	V/ $^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=10V, I_D=10A$	---	70	90	m $\Omega$
		$V_{GS}=4.5V, I_D=8A$	---	80	100	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	---	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-4.96	---	mV/ $^\circ\text{C}$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=48V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	$\mu\text{A}$
		$V_{DS}=48V, V_{GS}=0V, T_J=55^\circ\text{C}$	---	---	5	
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA
$g_{fs}$	Forward Transconductance	$V_{DS}=5V, I_D=10A$	---	7.6	---	S
$R_g$	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$	---	2.2	4.5	$\Omega$
$Q_g$	Total Gate Charge (4.5V)	$V_{DS}=48V, V_{GS}=4.5V, I_D=10A$	---	4.9	6.9	nC
$Q_{gs}$	Gate-Source Charge		---	1.8	2.52	
$Q_{gd}$	Gate-Drain Charge		---	2.2	3.1	
$T_{d(on)}$	Turn-On Delay Time	$V_{DS}=30V, V_{GS}=10V, R_G=3.3\Omega, I_D=10A$	---	1.6	3.2	ns
$T_r$	Rise Time		---	7.4	13	
$T_{d(off)}$	Turn-Off Delay Time		---	17.6	35	
$T_f$	Fall Time		---	4	8	
$C_{iss}$	Input Capacitance	$V_{DS}=15V, V_{GS}=0V, f=1\text{MHz}$	---	511	715	pF
$C_{oss}$	Output Capacitance		---	38	53	
$C_{riss}$	Reverse Transfer Capacitance		---	25	35	

**Guaranteed Avalanche Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy <sup>5</sup>	$V_{DD}=25V, L=0.1\text{mH}, I_{AS}=5A$	2.5	---	---	mJ

**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current <sup>1,6</sup>	$V_G=V_D=0V$ , Force Current	---	---	10	A
$I_{SM}$	Pulsed Source Current <sup>2,6</sup>		---	---	20	A
$V_{SD}$	Diode Forward Voltage <sup>2</sup>	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F=10A, dI/dt=100A/\mu s, T_J=25^\circ\text{C}$	---	9.7	---	nS
$Q_{rr}$	Reverse Recovery Charge		---	6.1	---	nC

Note :

- The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.
- The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
- The EAS data shows Max. rating. The test condition is  $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=11A$
- The power dissipation is limited by  $150^\circ\text{C}$  junction temperature
- The Min. value is 100% EAS tested guarantee.
- The data is theoretically the same as  $I_D$  and  $I_{DM}$ , in real applications, should be limited by total power dissipation.

## N-Ch 60V Fast Switching MOSFETs

### Typical Characteristics

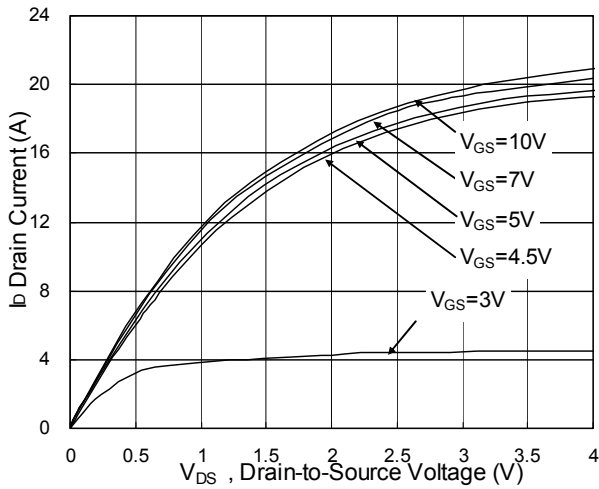


Fig.1 Typical Output Characteristics

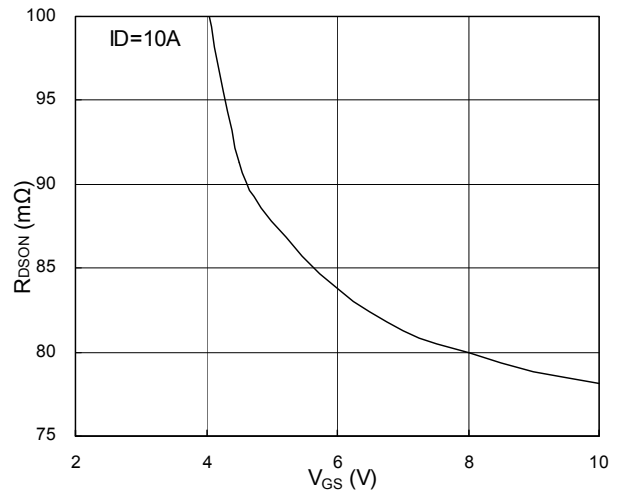


Fig.2 On-Resistance v.s Gate-Source

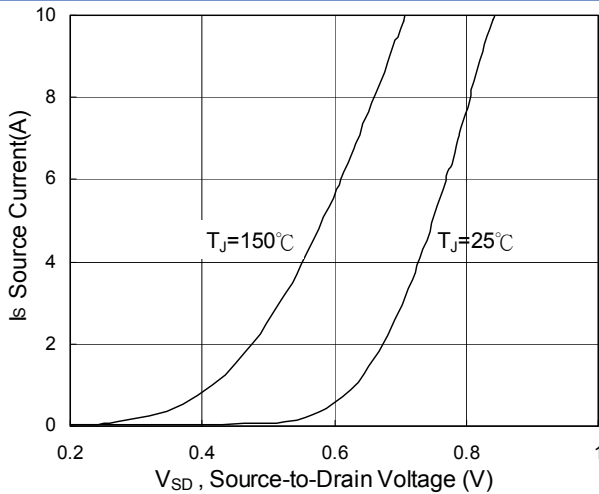


Fig.3 Forward Characteristics of Reverse

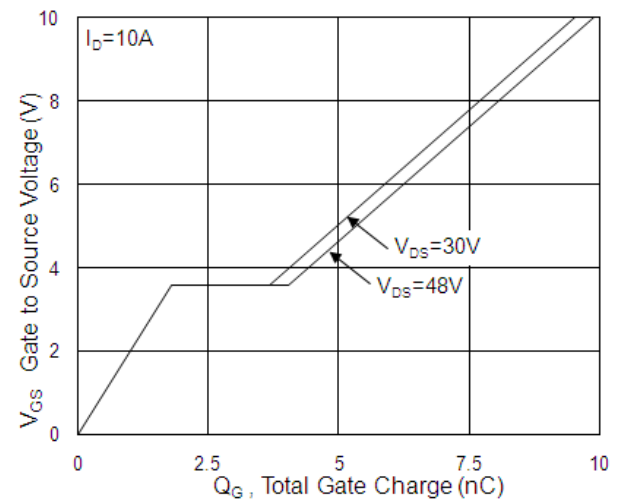


Fig.4 Gate-Charge Characteristics

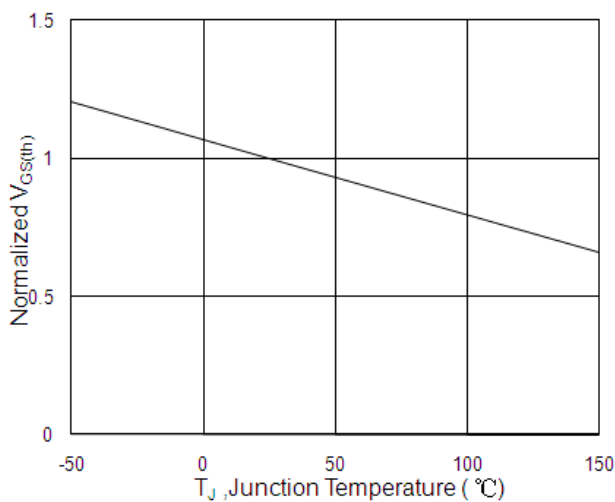


Fig.5 Normalized V<sub>GS(th)</sub> vs. T<sub>J</sub>

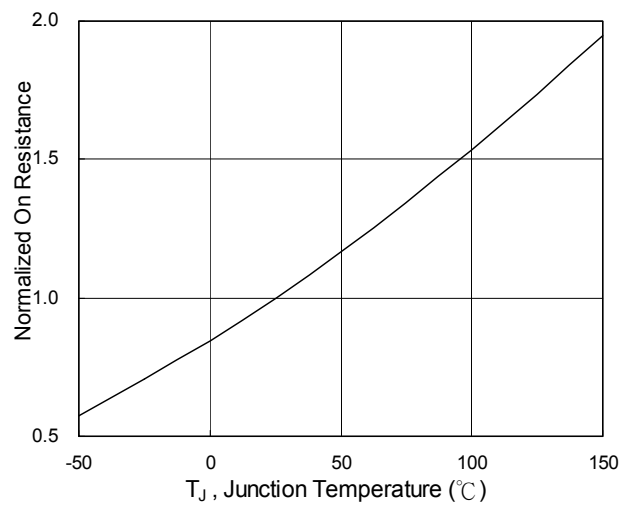
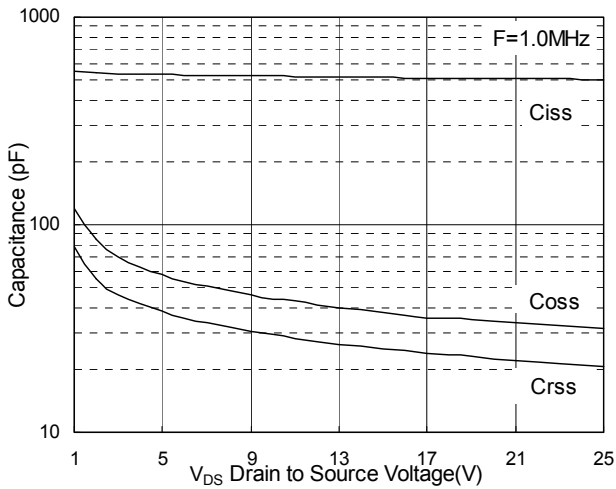
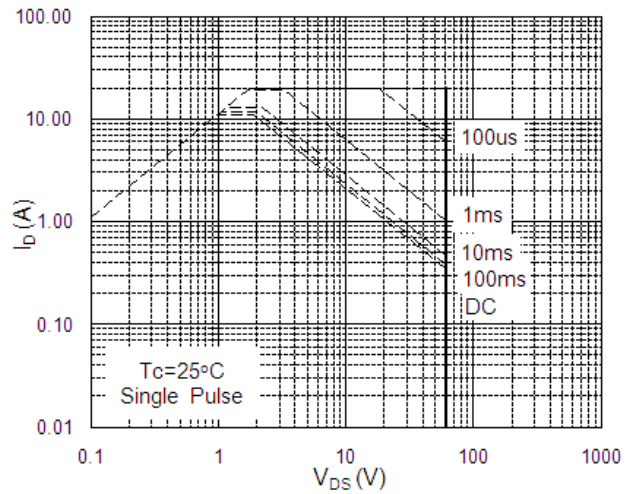


Fig.6 Normalized R<sub>DSON</sub> vs. T<sub>J</sub>

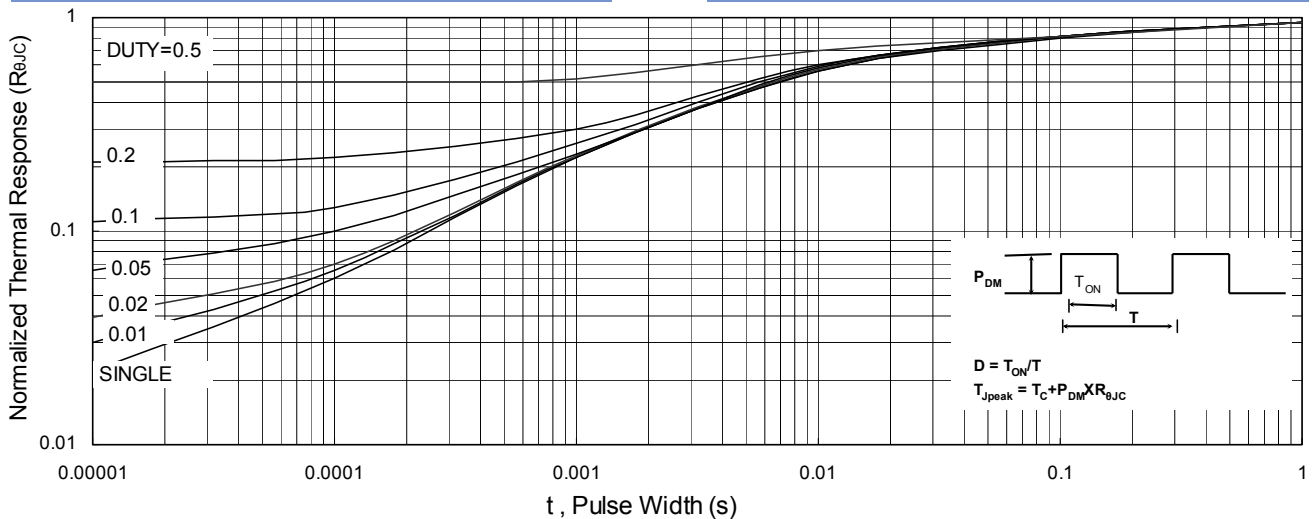
**N-Ch 60V Fast Switching MOSFETs**



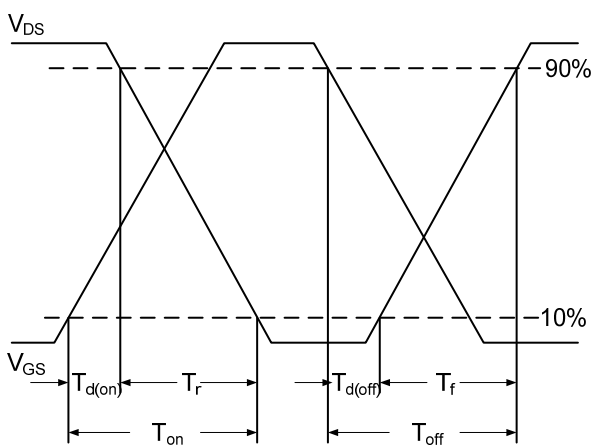
**Fig.7 Capacitance**



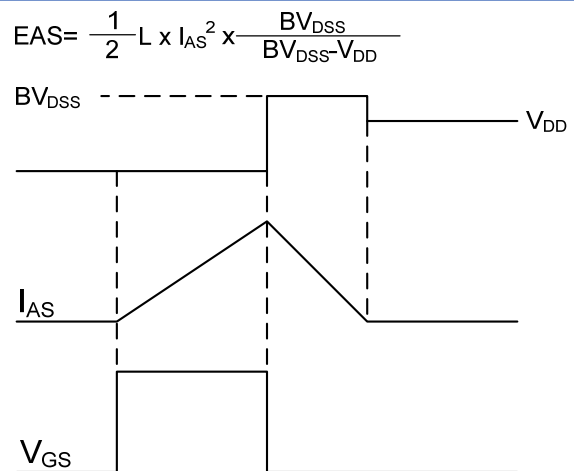
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**



**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Switching Waveform**