

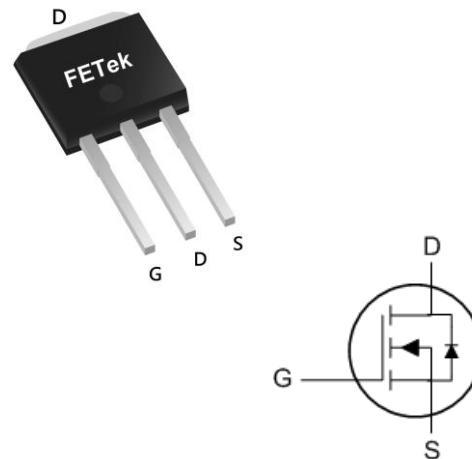
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Advanced high cell density Trench technology

**Product Summary**


BVDSS	RDSON	ID
30V	8.5mΩ	55A

**Description**

The FKR3004 is the high cell density trenched N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications. The FKR3004 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

**TO251 Pin Configuration**

**Absolute Maximum Ratings**

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V	55	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V	40	A
$I_D@T_A=25^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V <sup>1</sup>	13	A
$I_D@T_A=70^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V <sup>1</sup>	10.8	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	110	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	58	mJ
$I_{AS}$	Avalanche Current	34	A
$P_D@T_C=25^\circ C$	Total Power Dissipation <sup>4</sup>	41.6	W
$P_D@T_A=25^\circ C$	Total Power Dissipation <sup>4</sup>	2.42	W
$T_{STG}$	Storage Temperature Range	-55 to 175	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 175	$^\circ C$

**Thermal Data**

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State) <sup>1</sup>	---	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case	---	3.6	$^\circ C/W$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	$BV_{DSS}$ Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=1mA$	---	0.027	---	$V/^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=10V, I_D=20A$	---	---	8.5	m $\Omega$
		$V_{GS}=4.5V, I_D=10A$	---	---	14	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.0	---	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5.8	---	$mV/^\circ\text{C}$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=24V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	$\mu A$
		$V_{DS}=24V, V_{GS}=0V, T_J=55^\circ\text{C}$	---	---	5	
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA
$g_{fs}$	Forward Transconductance	$V_{DS}=5V, I_D=20A$	---	17.5	---	S
$R_g$	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1MHz$	---	2.2	4.4	$\Omega$
$Q_g$	Total Gate Charge (4.5V)	$V_{DS}=20V, V_{GS}=4.5V, I_D=12A$	---	12.8	---	nC
$Q_{gs}$	Gate-Source Charge		---	3.3	---	
$Q_{gd}$	Gate-Drain Charge		---	6.5	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=12V, V_{GS}=10V, R_G=3.3\Omega$ $I_D=5A$	---	4.5	---	ns
$T_r$	Rise Time		---	10.8	---	
$T_{d(off)}$	Turn-Off Delay Time		---	25.5	---	
$T_f$	Fall Time		---	9.6	---	
$C_{iss}$	Input Capacitance	$V_{DS}=15V, V_{GS}=0V, f=1MHz$	---	1317	---	pF
$C_{oss}$	Output Capacitance		---	163	---	
$C_{riss}$	Reverse Transfer Capacitance		---	131	---	

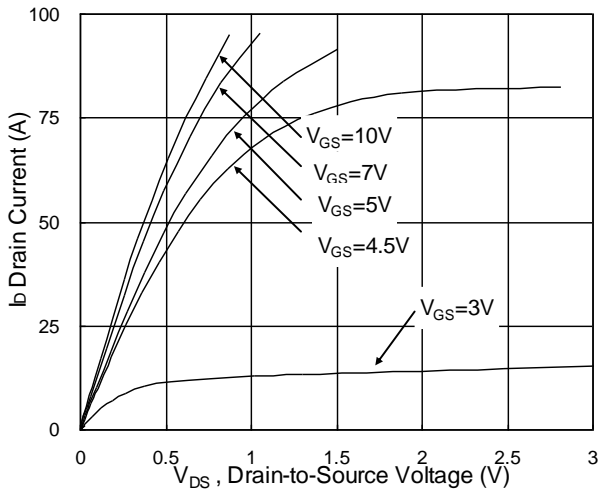
**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current <sup>1,5</sup>	$V_G=V_D=0V$ , Force Current	---	---	55	A
$I_{SM}$	Pulsed Source Current <sup>2,5</sup>		---	---	110	A
$V_{SD}$	Diode Forward Voltage <sup>2</sup>	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1.2	V

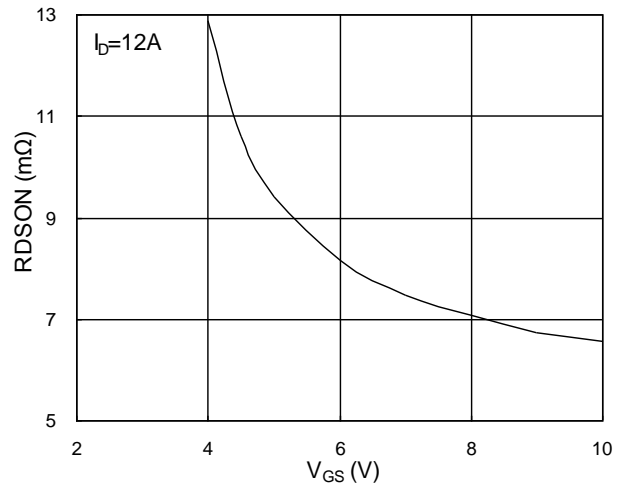
## Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 1OZ copper
- 2.The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is  $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=34A$
- 4.The power dissipation is limited by  $175^\circ\text{C}$  junction temperature
- 5.The data is theoretically the same as  $I_D$  and  $I_{DM}$  , in real applications , should be limited by total power dissipation.

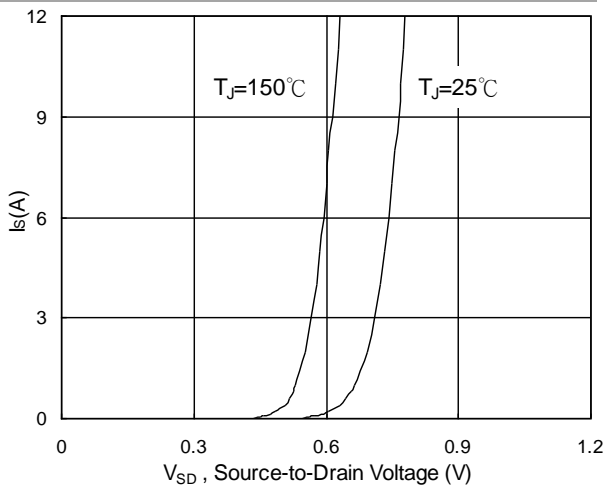
**Typical Characteristics**



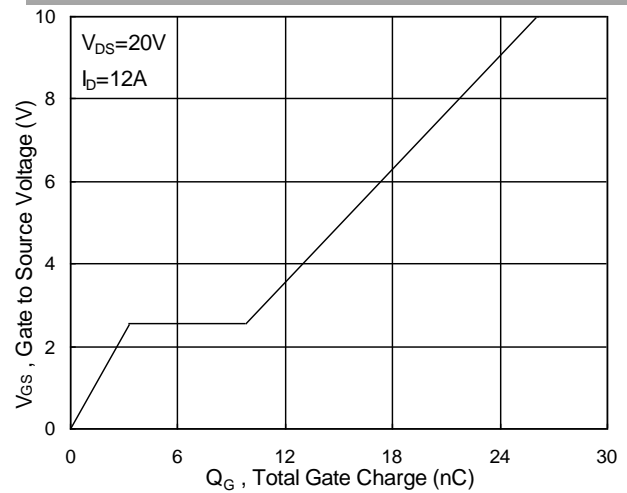
**Fig.1 Typical Output Characteristics**



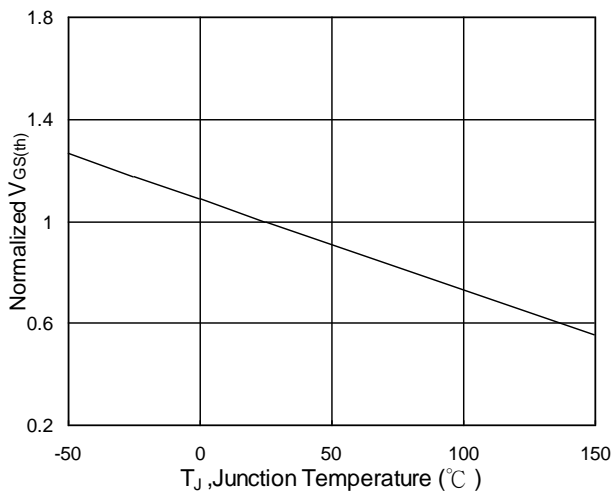
**Fig.2 On-Resistance vs. G-S Voltage**



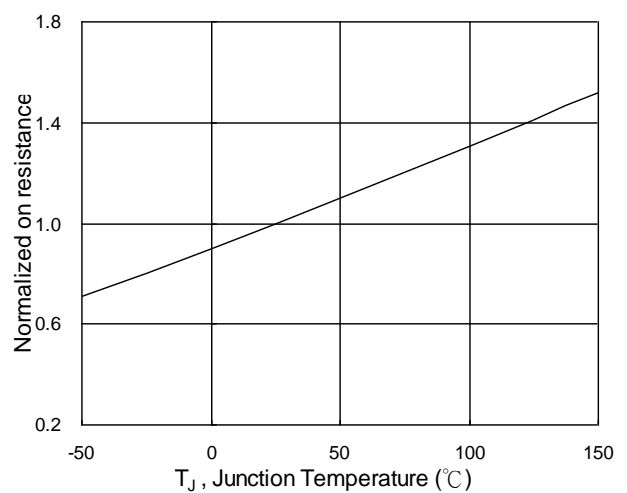
**Fig.3 Forward Characteristics of Reverse**



**Fig.4 Gate-Charge Characteristics**



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



**Fig.6 Normalized R<sub>DS(on)</sub> vs. T<sub>J</sub>**

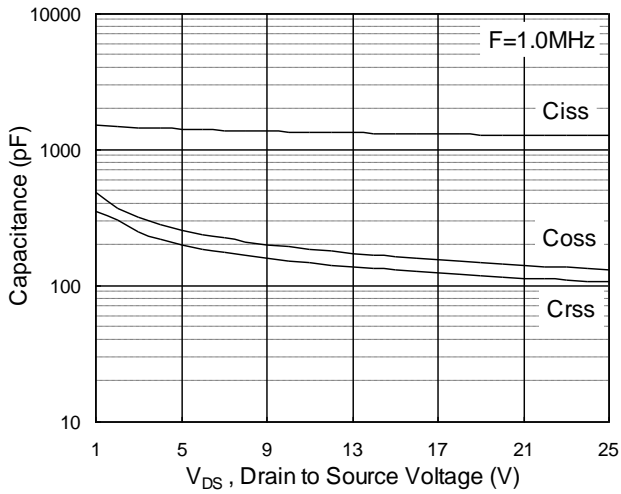


Fig.7 Capacitance

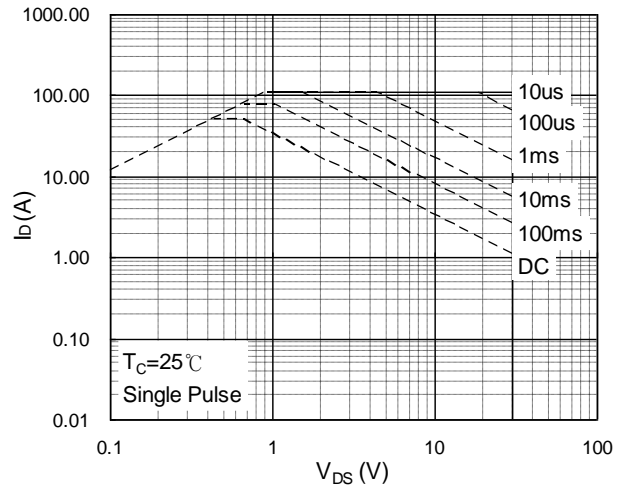


Fig.8 Safe Operating Area

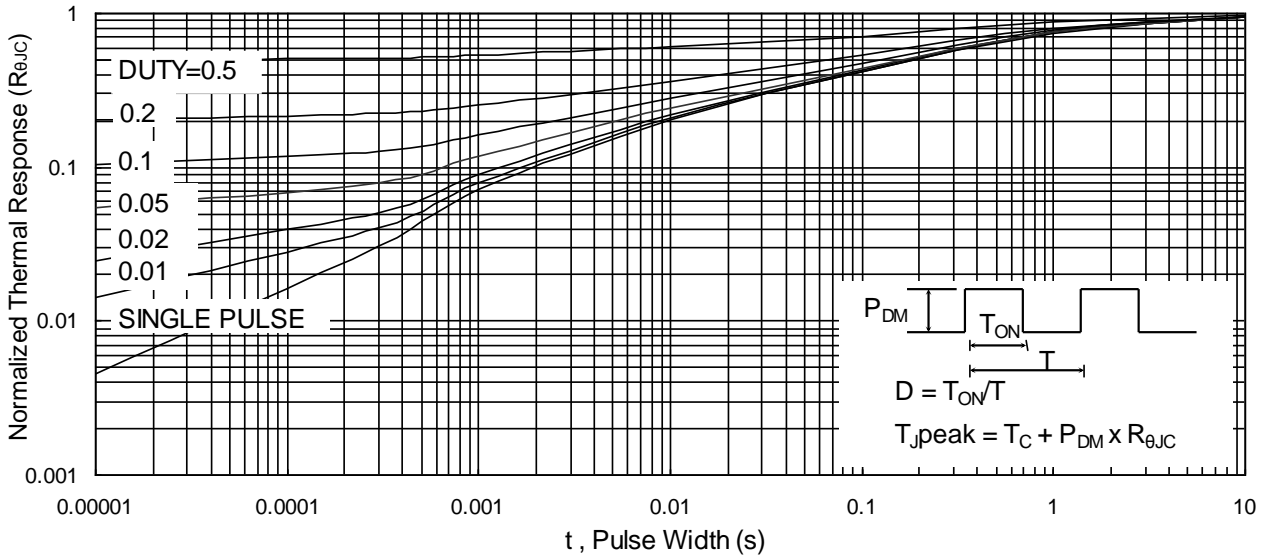


Fig.9 Normalized Maximum Transient Thermal Impedance

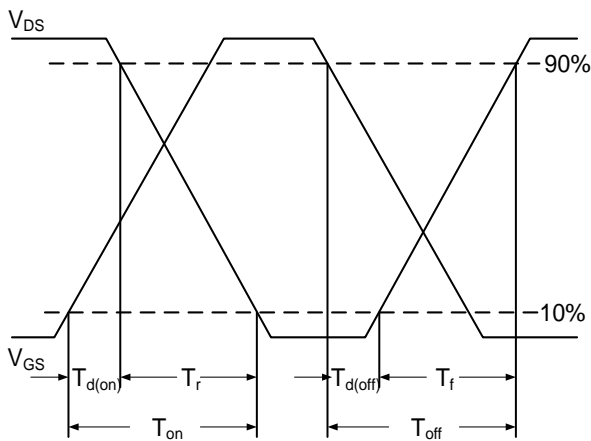


Fig.10 Switching Time Waveform

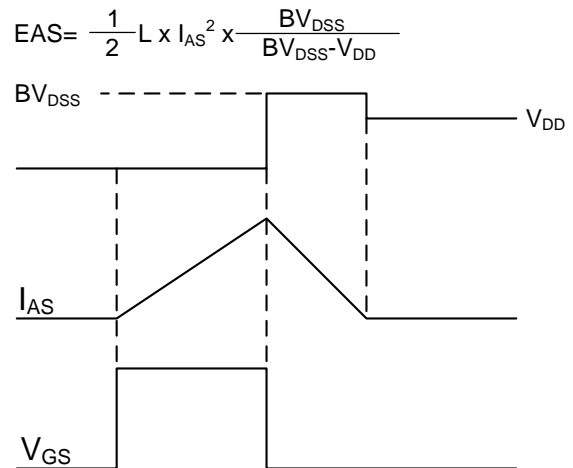


Fig.11 Unclamped Inductive Switching Waveform