

Description

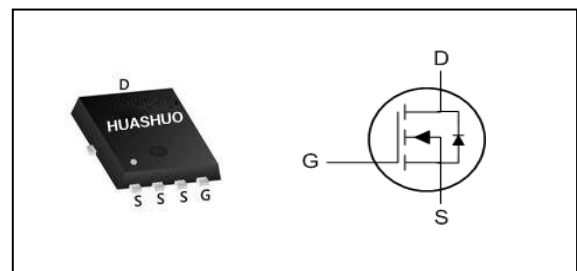
- Advanced Trench MOS Technology
- Low Gate Charge
- Low $R_{DS(ON)}$
- 100% EAS Guaranteed
- Green Device Available

Product Summary

V_{DS}	60	V
$R_{DS(ON),typ}$	8	m Ω
I_D	33	A

Application

- Motor Control.
- DC/DC Converter.
- Synchronous rectifier applications.

PRPAK3X3 Pin Configuration

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current ¹	33	A
$I_D@T_C=100^\circ\text{C}$	Continuous Drain Current ¹	21	A
I_{DM}	Pulsed Drain Current ²	100	A
EAS	Single Pulse Avalanche Energy ³	54	mJ
I_{AS}	Avalanche Current	33	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation ⁴	21	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	60	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	6	$^\circ\text{C/W}$



Electrical Characteristics (T_J=25 °C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	60	---	---	V
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =12A	---	8	12	mΩ
		V _{GS} =4.5V, I _D =12A	---	13	18	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.2	2	2.3	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =48V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =48V, V _{GS} =0V, T _J =55°C	---	---	5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	1.0	---	Ω
Q _g	Total Gate Charge (10V)	V _{DS} =30V, V _{GS} =10V, I _D =12A	---	16	---	nC
Q _{gs}	Gate-Source Charge		---	3.5	---	
Q _{gd}	Gate-Drain Charge		---	4.2	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =30V, V _{GS} =10V, R _G =3.3Ω, I _D =12A	---	5.7	---	ns
T _r	Rise Time		---	3.5	---	
T _{d(off)}	Turn-Off Delay Time		---	26	---	
T _f	Fall Time		---	3.5	---	
C _{iss}	Input Capacitance	V _{DS} =30V, V _{GS} =0V, f=1MHz	---	760	---	pF
C _{oss}	Output Capacitance		---	278	---	
C _{rss}	Reverse Transfer Capacitance		---	25	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current ^{1,5}	V _G =V _D =0V, Force Current	---	---	33	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =A, T _J =25°C	---	---	1.2	V

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The EAS data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=33A
- 4.The power dissipation is limited by 150°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.

N-Ch 60V Fast Switching MOSFETs

Typical Characteristics

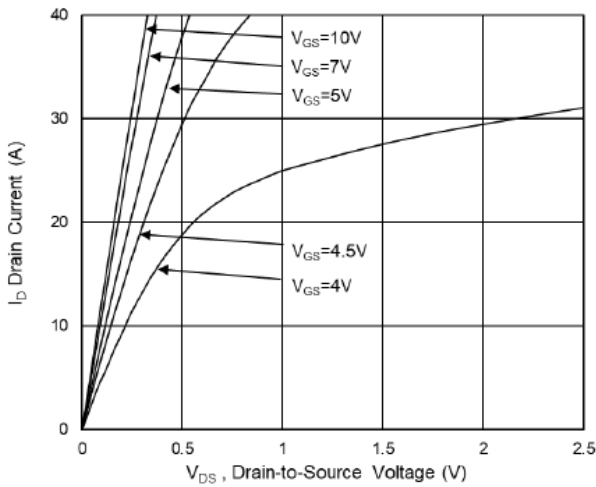


Fig.1 Typical Output Characteristics

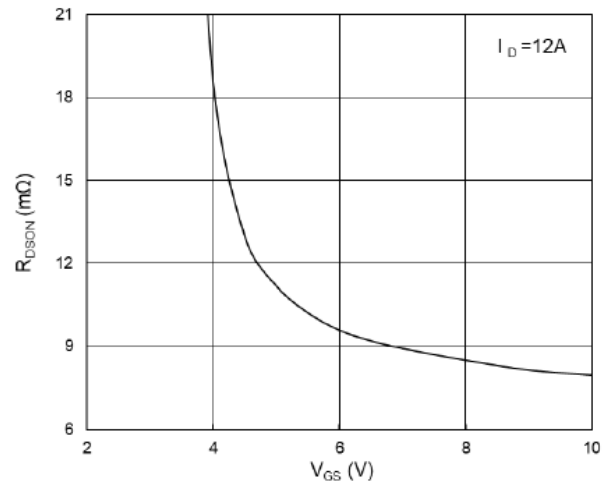


Fig.2 On-Resistance vs. Gate-Source

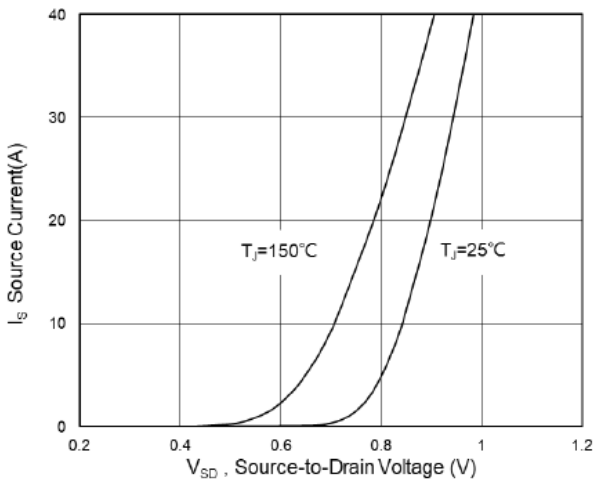


Fig.3 Source Drain Forward Characteristics

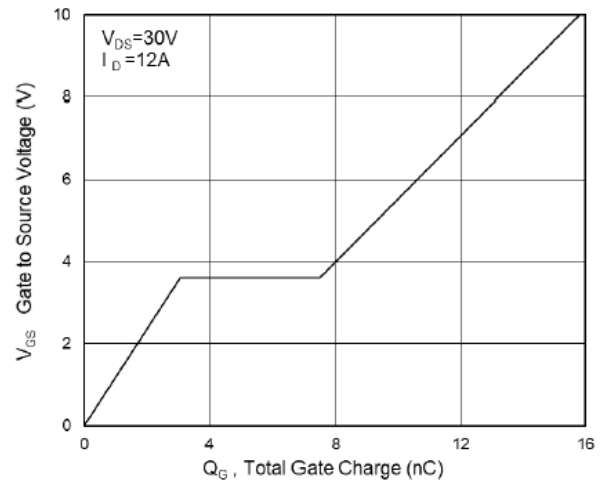


Fig.4 Gate-Charge Characteristics

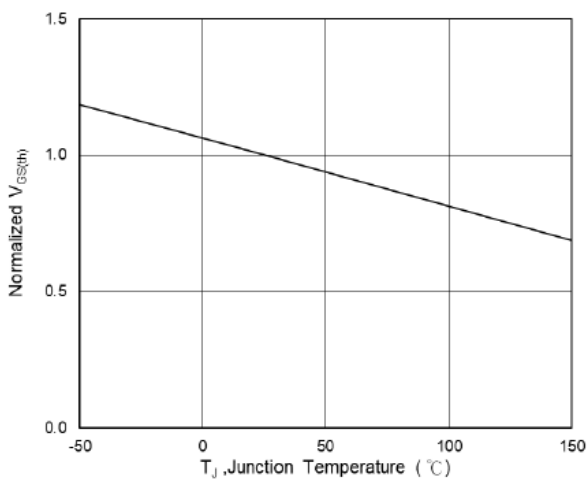


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

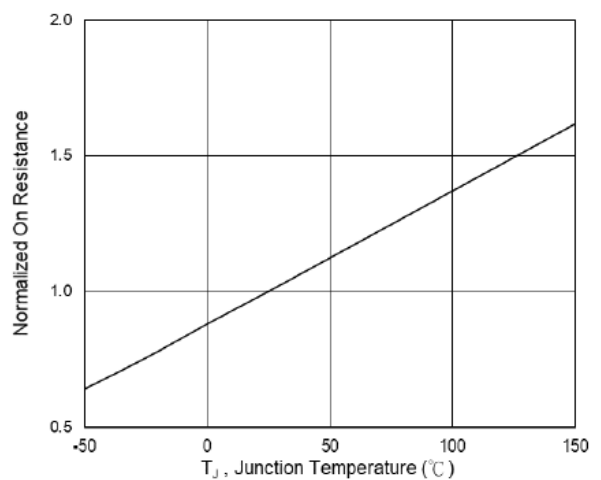


Fig.6 Normalized R_{DSON} vs. T_J



N-Ch 60V Fast Switching MOSFETs

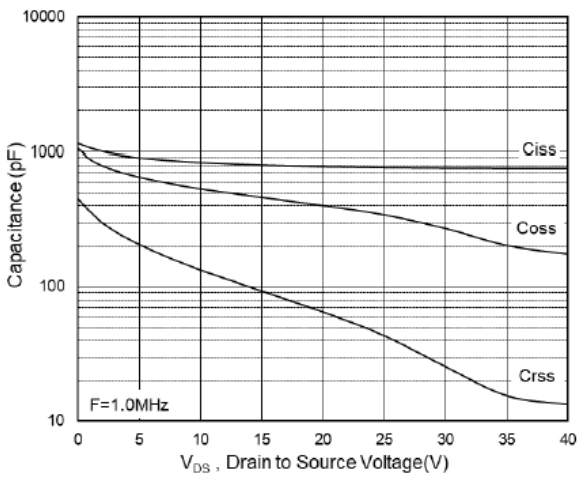


Fig.7 Capacitance

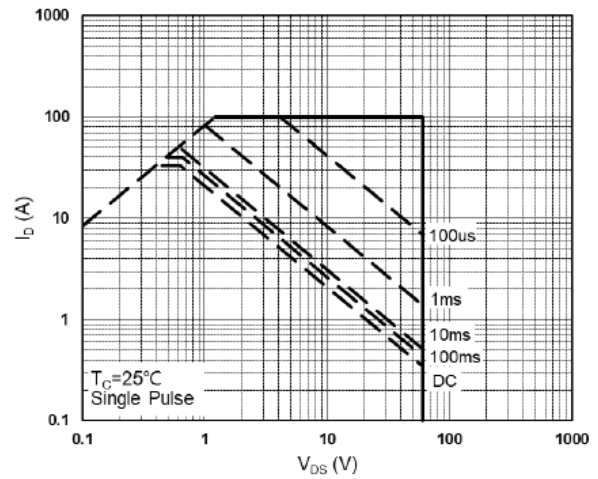


Fig.8 Safe Operating Area

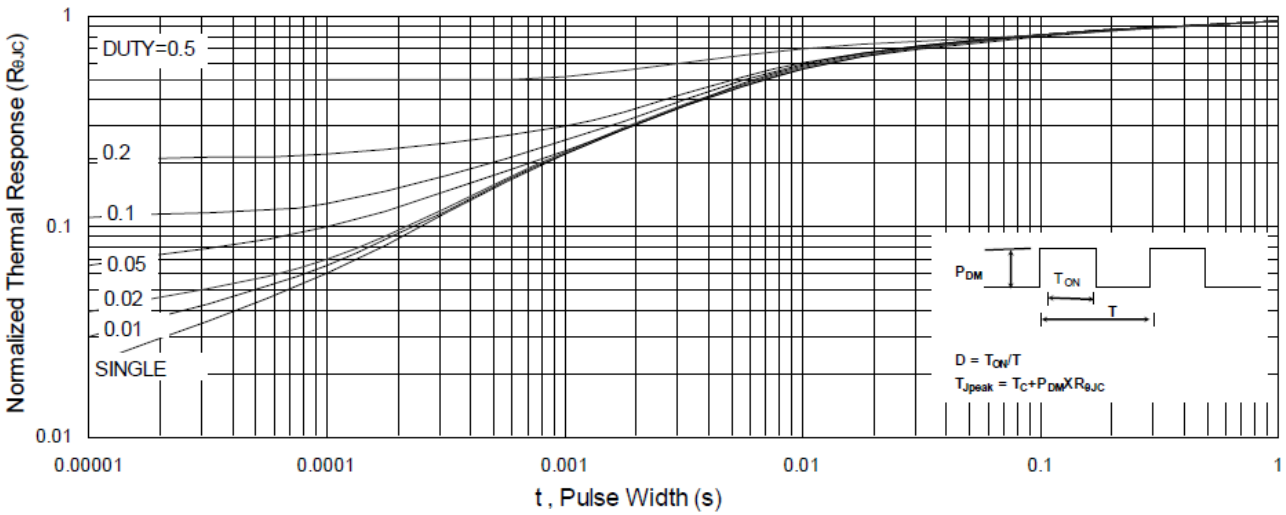


Fig.9 Normalized Maximum Transient Thermal Impedance

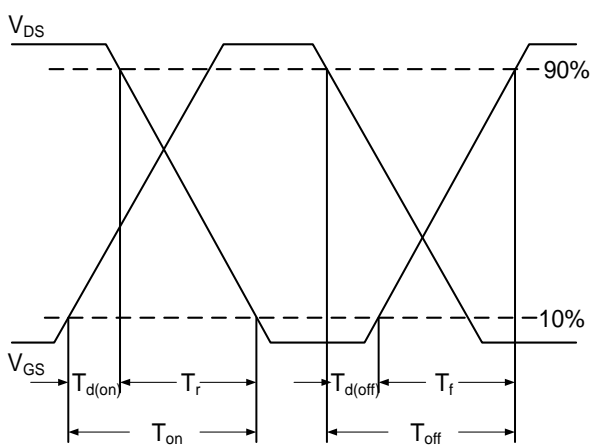


Fig.10 Switching Time Waveform

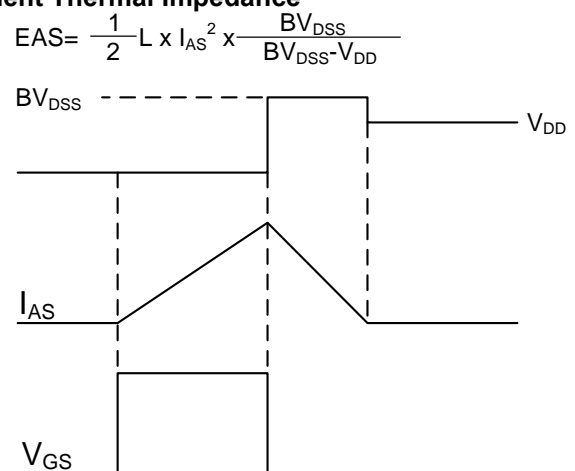


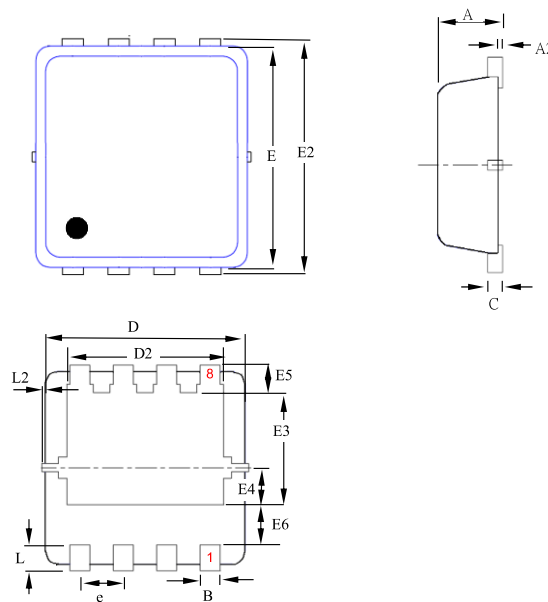
Fig.11 Unclamped Inductive Switching Waveform

$$EAS = \frac{1}{2} L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

Ordering Information

Part Number	Package code	Packaging
HSBB6054	PRPAK3*3	3000/Tape&Reel

PRPAK 3*3(E) Single Outline



SYMBOLS	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.80	0.90	0.028	0.031	0.035
A2	0.00	--	0.05	0.000	--	0.002
B	0.24	0.30	0.35	0.009	0.012	0.014
C	0.10	0.15	0.25	0.004	0.006	0.010
D	2.90	3.00	3.20	0.114	0.118	0.126
D2	2.15	2.35	2.59	0.085	0.093	0.102
E	2.90	3.00	3.12	0.114	0.118	0.123
E2	3.05	3.20	3.45	0.120	0.126	0.136
E3	1.55	1.75	1.95	0.061	0.069	0.077
E4	0.48	0.58	0.68	0.019	0.023	0.027
E5	0.28	0.43	0.58	0.011	0.017	0.023
E6	0.43	0.63	0.87	0.017	0.025	0.034
L	0.30	0.40	0.50	0.012	0.016	0.020
L2	0.00	--	0.10	0.000	--	0.004
e	--	0.65	--	--	0.026	--