General Description

The WSF3087 is the highest performance trench N-ch MOSFET with extreme high cell density , which provide excellent RDSON and gate charge for most of the synchronous buck converter applications .

The WSF3087 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

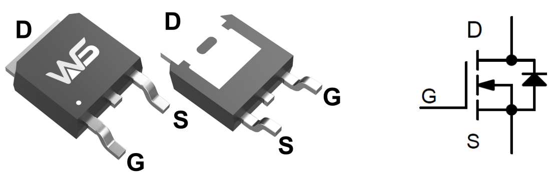
Product Summery

BVDSS	RDSON	ID
30V	5.0mΩ	70A

Applications

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

TO-252 Pin Configuration



Absolute Maximum Ratings

<table>
<tr><th rowspan="2">Symbol</th><th rowspan="2">Parameter</th><th colspan="2">Rating</th><th rowspan="2">Units</th></tr>
<tr><th>10s</th><th>Steady State</th></tr>
<tr><td>V_{DS}</td><td>Drain-Source Voltage</td><td colspan="2">30</td><td>V</td></tr>
<tr><td>V_{GS}</td><td>Gate-Source Voltage</td><td colspan="2">±20</td><td>V</td></tr>
<tr><td>I_D@T_C=25℃</td><td>Continuous Drain Current, V_{GS} @ 10V[1]</td><td colspan="2">70</td><td>A</td></tr>
<tr><td>I_D@T_C=100℃</td><td>Continuous Drain Current, V_{GS} @ 10V[1]</td><td colspan="2">60</td><td>A</td></tr>
<tr><td>I_D@T_A=25℃</td><td>Continuous Drain Current, V_{GS} @ 10V[1]</td><td>21</td><td>15</td><td>A</td></tr>
<tr><td>I_D@T_A=70℃</td><td>Continuous Drain Current, V_{GS} @ 10V[1]</td><td>18</td><td>11</td><td>A</td></tr>
<tr><td>I_{DM}</td><td>Pulsed Drain Current[2]</td><td colspan="2">150</td><td>A</td></tr>
<tr><td>EAS</td><td>Single Pulse Avalanche Energy[3]</td><td colspan="2">232</td><td>mJ</td></tr>
<tr><td>I_{AS}</td><td>Avalanche Current</td><td colspan="2">41</td><td>A</td></tr>
<tr><td>P_D@T_C=25℃</td><td>Total Power Dissipation[4]</td><td colspan="2">51</td><td>W</td></tr>
<tr><td>P_D@T_A=25℃</td><td>Total Power Dissipation[4]</td><td>6</td><td>2.0</td><td>W</td></tr>
<tr><td>T_{STG}</td><td>Storage Temperature Range</td><td colspan="2">-55 to 175</td><td>℃</td></tr>
<tr><td>T_J</td><td>Operating Junction Temperature Range</td><td colspan="2">-55 to 175</td><td>℃</td></tr>
</table>

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{θJA}$	Thermal Resistance Junction-ambient (Steady State)[1]	---	62	℃/W
$R_{θJA}$	Thermal Resistance Junction-Ambient [1] (t ≤10s)	---	25	℃/W
$R_{θJC}$	Thermal Resistance Junction-Case[1]	---	2.8	℃/W

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	30	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BVDSS Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.028	---	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=30A	---	5.0	6.0	mΩ
		V_{GS}=4.5V , I_D=15A	---	8.0	9.5	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.0	1.5	2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-6.16	---	mV/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=24V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=24V , V_{GS}=0V , T_J=55℃	---	---	5	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=5V , I_D=30A	---	43	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	1.7	3.1	Ω
Q_g	Total Gate Charge (4.5V)	V_{DS}=15V , V_{GS}=4.5V , I_D=15A	---	20	28	nC
Q_{gs}	Gate-Source Charge		---	7.6	10.6	
Q_{gd}	Gate-Drain Charge		---	7.2	10.1	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=15V , V_{GS}=10V , R_G=3.3Ω I_D=15A	---	11	15.6	ns
T_r	Rise Time		---	15	27	
$T_{d(off)}$	Turn-Off Delay Time		---	37.3	74.6	
T_f	Fall Time		---	10.6	21.2	
C_{iss}	Input Capacitance	V_{DS}=15V , V_{GS}=0V , f=1MHz	---	2100	---	pF
C_{oss}	Output Capacitance		---	550	---	
C_{rss}	Reverse Transfer Capacitance		---	180	---	

Guaranteed Avalanche Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy[5]	V_{DD}=25V , L=0.1mH , I_{AS}=24A	55	---	---	mJ

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,6]	V_G=V_D=0V , Force Current	---	---	30	A
I_{SM}	Pulsed Source Current[2,6]		---	---	155	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1.3	V
t_{rr}	Reverse Recovery Time	IF=30A , dI/dt=100A/μs , T_J=25℃	---	25	---	nS
Q_{rr}	Reverse Recovery Charge		---	21	---	nC

Note :
1.The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper,t<10sec.
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}=24A
4.The power dissipation is limited by 175℃ junction temperature
5.The Min. value is 100% EAS tested guarantee.
6.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

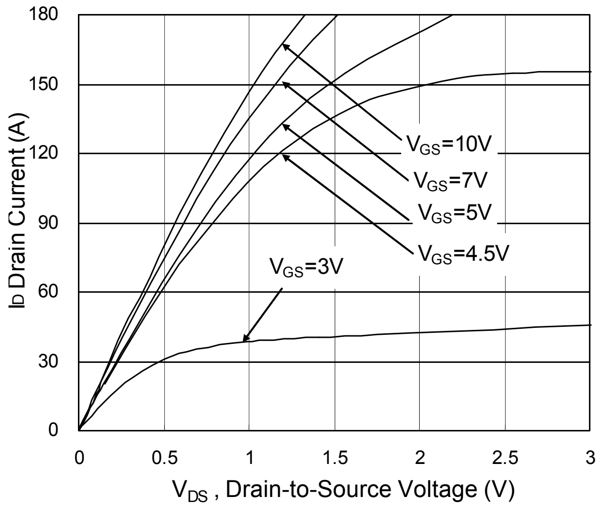


Fig.1 Typical Output Characteristics

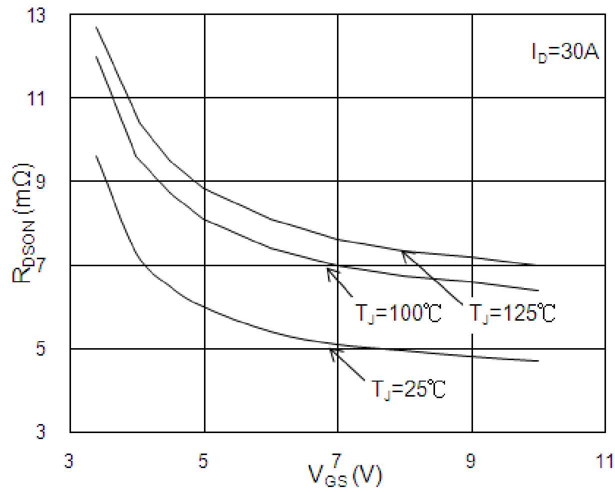


Fig.2 On-Resistance vs. G-S Voltage

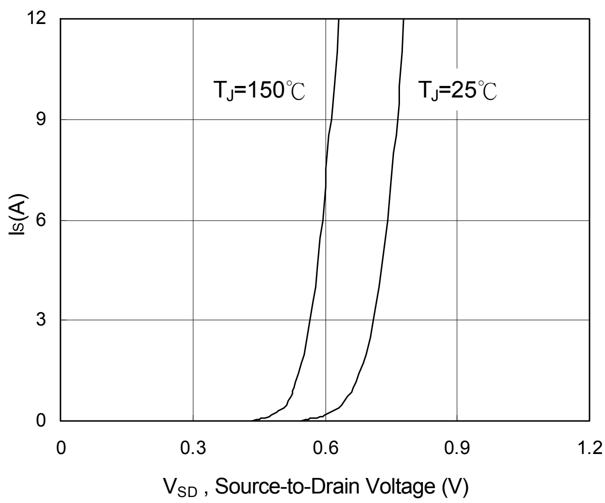


Fig.3 Forward Characteristics of Reverse

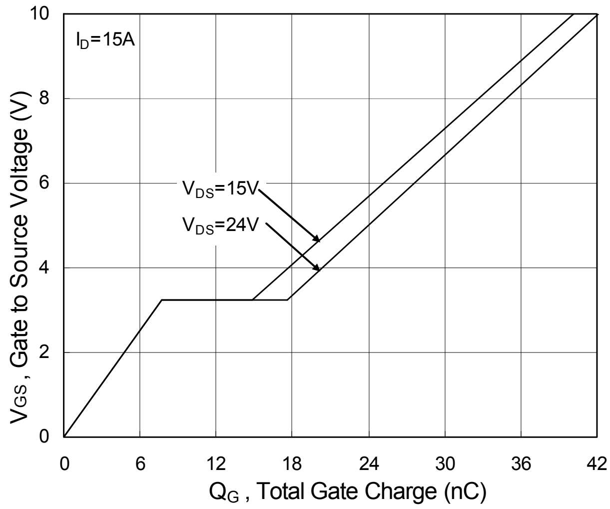


Fig.4 Gate-Charge Characteristics

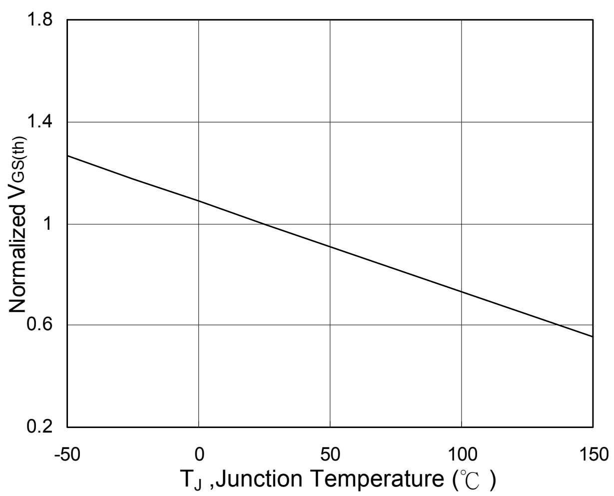


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

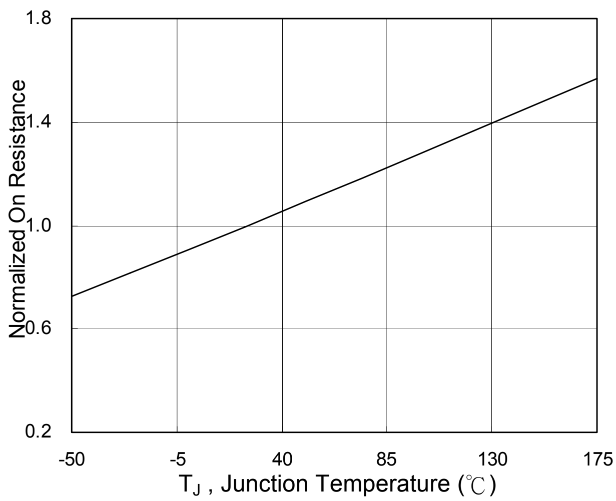
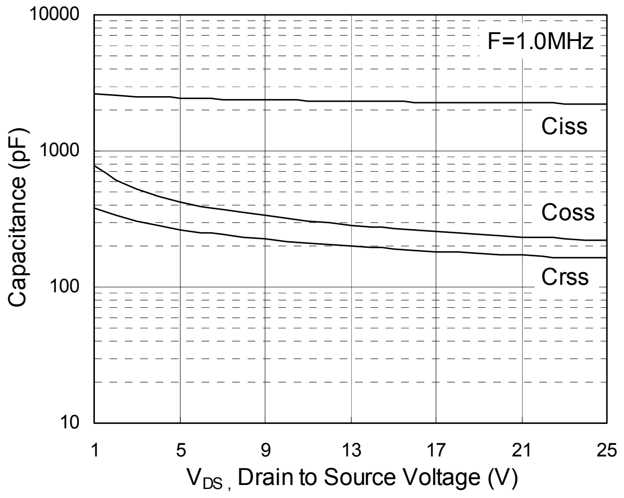


Fig.6 Normalized R_{DSON} vs. T_J



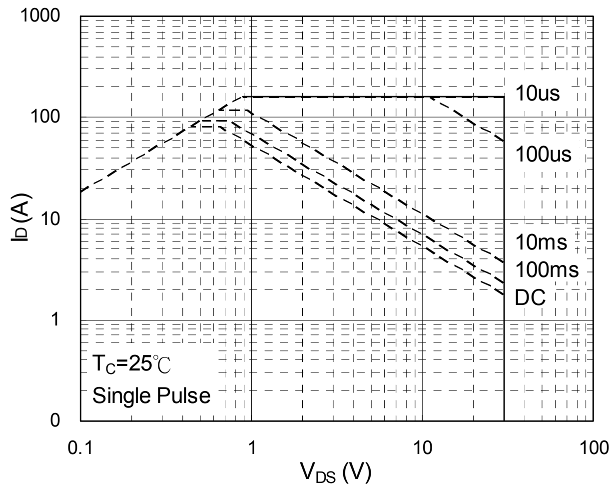


Fig.7 Capacitance

Fig.8 Safe Operating Area

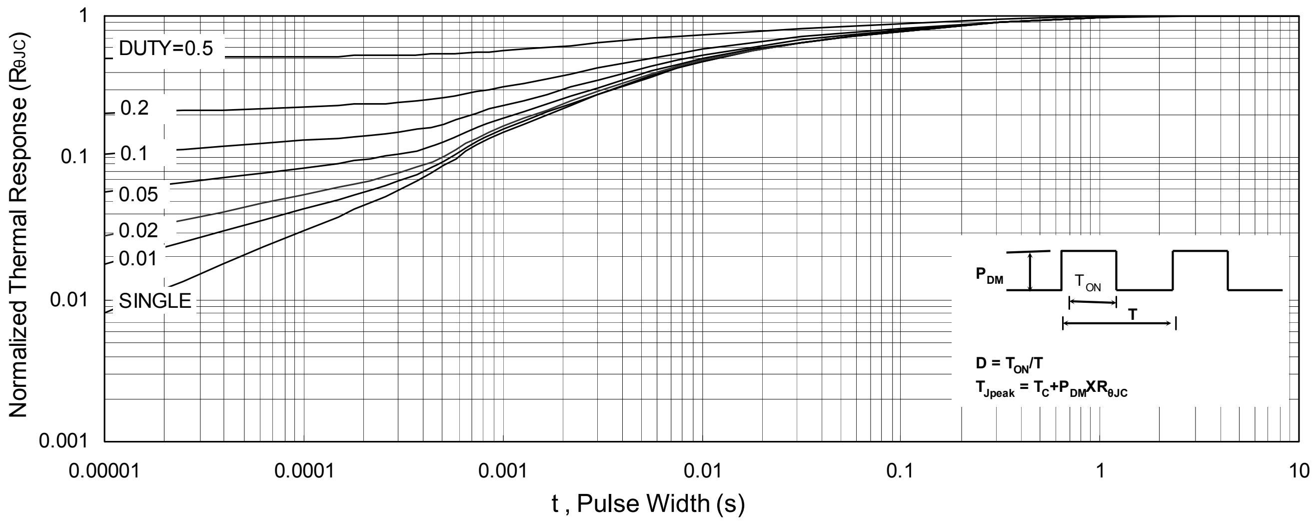
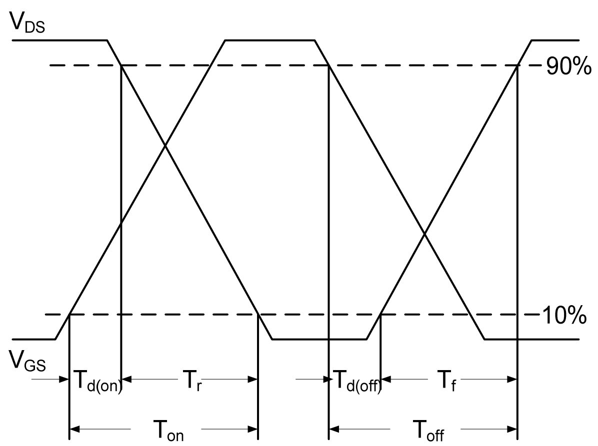


Fig.9 Normalized Maximum Transient Thermal Impedance



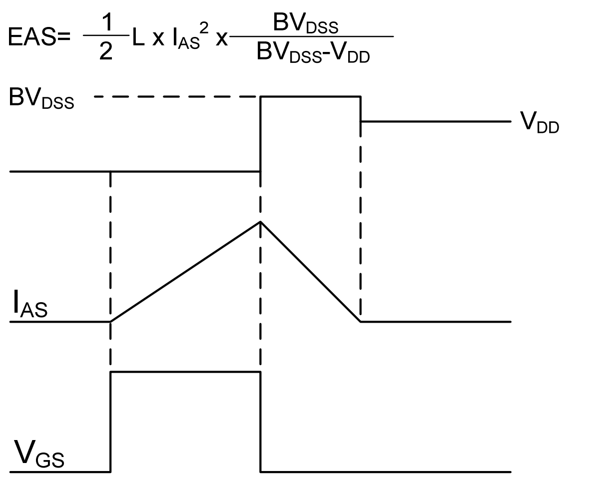


Fig.10 Switching Time Waveform

Fig.11 Unclamped Inductive Switching Waveform

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