

Features

Low Gate Charge
High Power and current handling capability
Lead free product is acquired

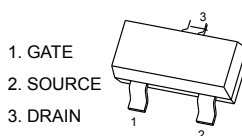
V_{DS} -30 V
 I_D -3 A
 $R_{DS(ON)}$ 120m Ω

S33

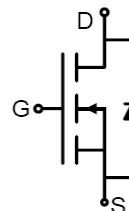
Applications

DC/DC Converter
Ideal for high-frequency switching and synchronous rectification

SOT-23



Equivalent Circuit



MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Limit	Unit
V_{DS}	Drain-Source Voltage ($V_{GS}=0V$)	-18	V
V_{GS}	Gate-Source Voltage ($V_{DS}=0V$)	± 12	V
I_D	Drain Current-Continuous($T_A=25^\circ\text{C}$)	-7	A
	Drain Current-Continuous($T_A=100^\circ\text{C}$)	-4.5	A
I_{DM} (pluse)	Drain Current-Continuous@ Current-Pulsed (Note 1)	28.4	A
P_D	Maximum Power Dissipation($T_A=25^\circ\text{C}$)	1.6	W
	Maximum Power Dissipation($T_A=100^\circ\text{C}$)	0.6	W
E_{AS}	Avalanche energy (Note 2)	42	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient		79	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V I _D =250μA	-18			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-12V, V _{GS} =0V T _J =25℃			-1	μA
		V _{DS} =-12 V V _{GS} =0V T _J =125℃			100	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±12V, V _{DS} =0V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	-0.5		-1	V
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-3A		11.5		S
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =-4.5V, I _D =-7A T _J =25℃		19	25	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =-2.5V, I _D =-5A T _J =25℃		24	30	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =-6V,V _{GS} =0V, f=1.0MHz		1330		pF
C _{oss}	Output Capacitance			252		pF
C _{rss}	Reverse Transfer Capacitance			224		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1.0MHz		6.4		Ω
Switching Parameters						
t _{d(on)}	Turn-on Delay Time	V _{GS} =-4.5V, V _{DS} =-6V, R _L =2Ω, R _{GEN} =3Ω		25		nS
t _r	Turn-on Rise Time			45		nS
t _{d(off)}	Turn-Off Delay Time			71		nS
t _f	Turn-Off Fall Time			60		nS
Q _g	Total Gate Charge	V _{GS} =-4.5V, V _{DS} =-6V, I _D =-3A		15		nC
Q _{gs}	Gate-Source Charge			1.4		nC
Q _{gd}	Gate-Drain Charge			3.2		nC
Source-Drain Diode Characteristics						
I _{SD}	Source-Drain Current (Body Diode)				-7	A
V _{SD}	Forward on Voltage (Note 3)	V _{GS} =0V, I _S =-3A			-1.2	V
t _{rr}	Reverse Recovery Time	I _F =-3A, dI/dt=100A/μs		18		ns
Q _{rr}	Reverse Recovery Charge	I _F =-3A, dI/dt=100A/μs		7		nC

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature.

Notes 2. E_{AS} condition: $T_J=25^{\circ}\text{C}, V_{DS}=-12V, V_G=-10V, R_g=25\Omega, L=0.5\text{mH}$.

Notes 3.Repetitive Rating: Pulse width limited by maximum junction temperature.

RATING AND CHARACTERISTIC CURVES

Figure 1. Output Characteristics

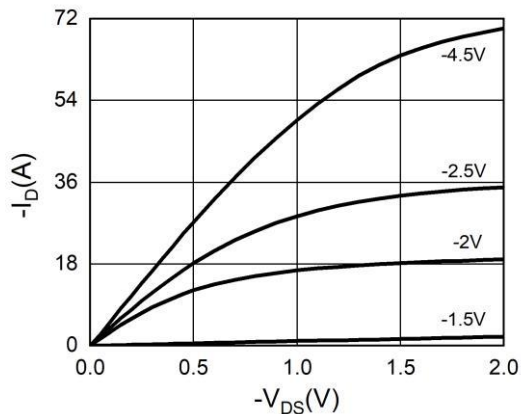


Figure 2. Transfer Characteristics

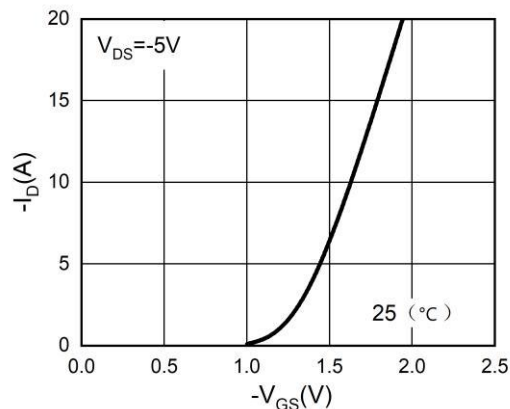


Figure 3. Power Dissipation

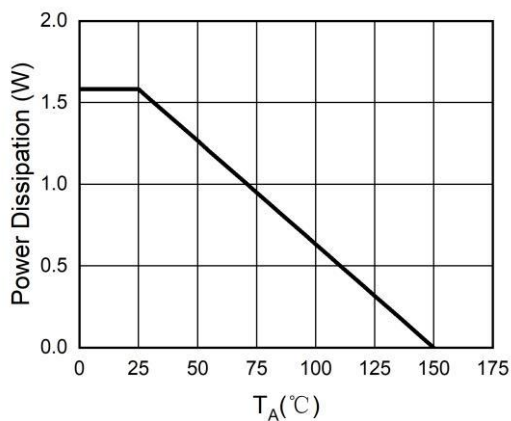


Figure 4. Drain Current

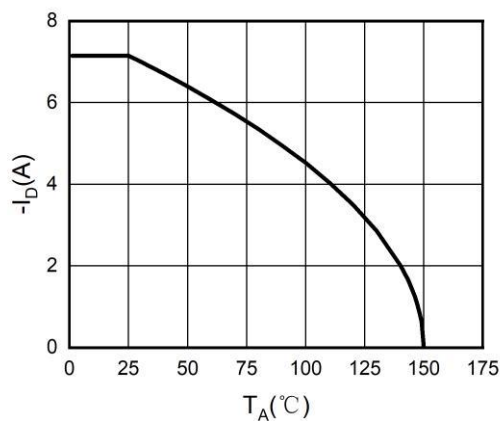


Figure 5. BV_{DSS} vs Junction Temperature

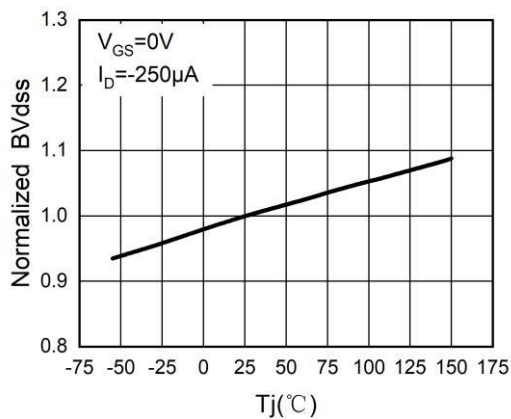
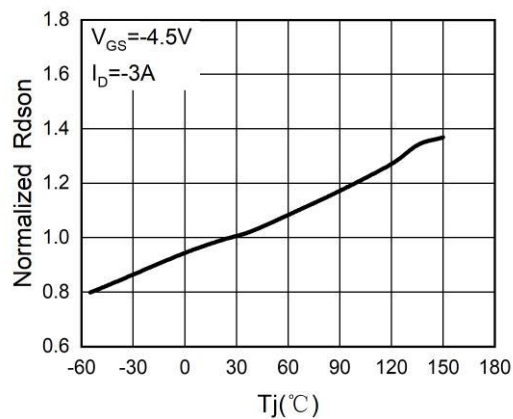


Figure 6. $R_{DS(ON)}$ vs Junction Temperature



RATING AND CHARACTERISTIC CURVES

Figure 7. Gate Charge Waveforms

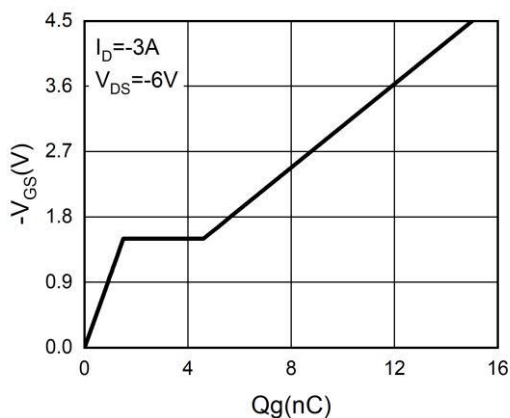


Figure 8. Capacitance

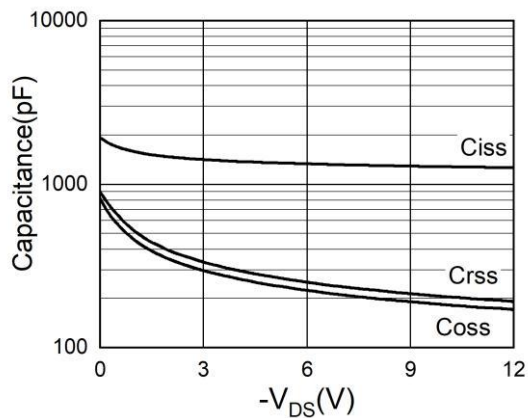


Figure 9. Body Diode Characteristics

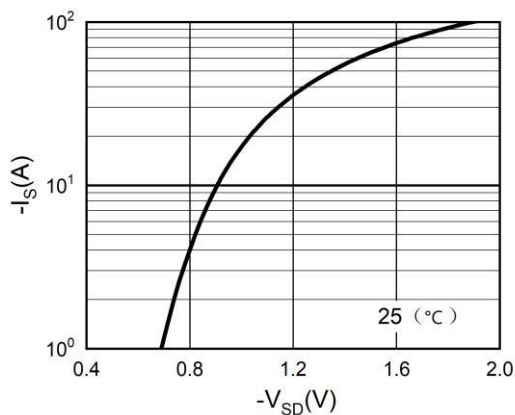
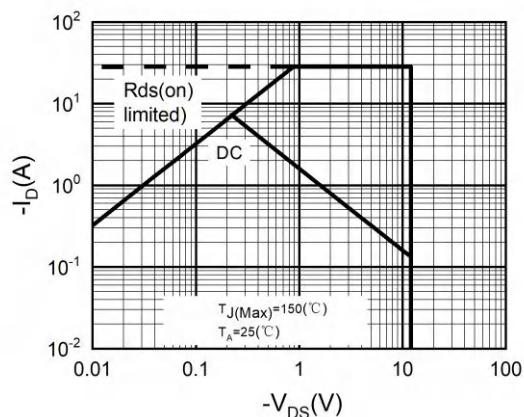
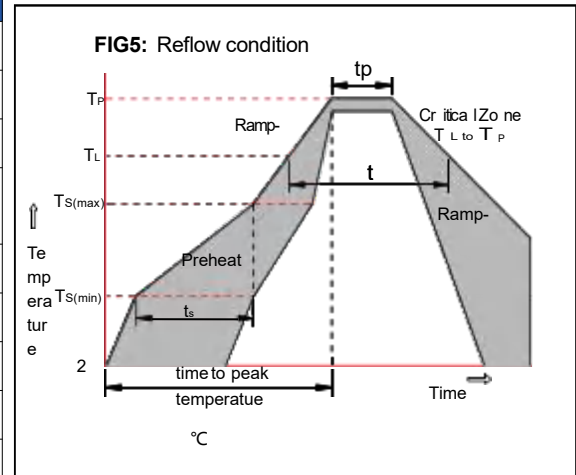


Figure 10. Maximum Safe Operating Area



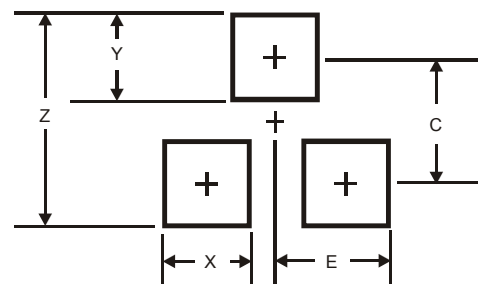
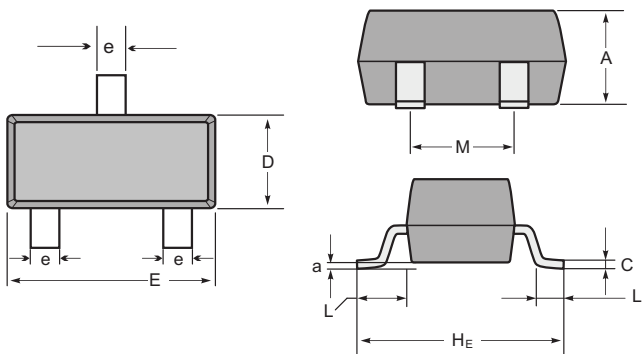
Soldering parameters

Reflow Condition		Pb-Free assembly (see as below)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150°C
	-Temperature Max($T_{s(max)}$)	+200°C
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3°C/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3°C/sec. Max
Reflow	-Temperature(T_L)(Liquid us)	+217°C
	-Temperature(t_L)	60-150 secs.
Peak Temp (T_P)		+260(+0/-5)°C
Time within 5°C of actual Peak Temp (t_P)		30 secs. Max
Ramp-down Rate		6°C/sec. Max
Time 25°C to Peak Temp (T_P)		8 min. Max
Do not exceed		+260°C



Package Dimensions & Suggested Pad Layout

SOT23



SOT-23 mechanical data

UNIT	A	C	D	E	H _E	e	M	L	L ₁	a
mm	max	1.1	0.15	1.4	3.0	2.6	0.5	1.95	0.55 (ref)	0.0
	min	0.9	0.08	1.2	2.8	2.2	0.3	1.7	0.36 (ref)	0.15
mil	max	43	6	55	118	102	20	77	22 (ref)	0.0
	min	35	3	47	110	87	12	67	14 (ref)	6

Dimensions	SOT23
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

