



Features

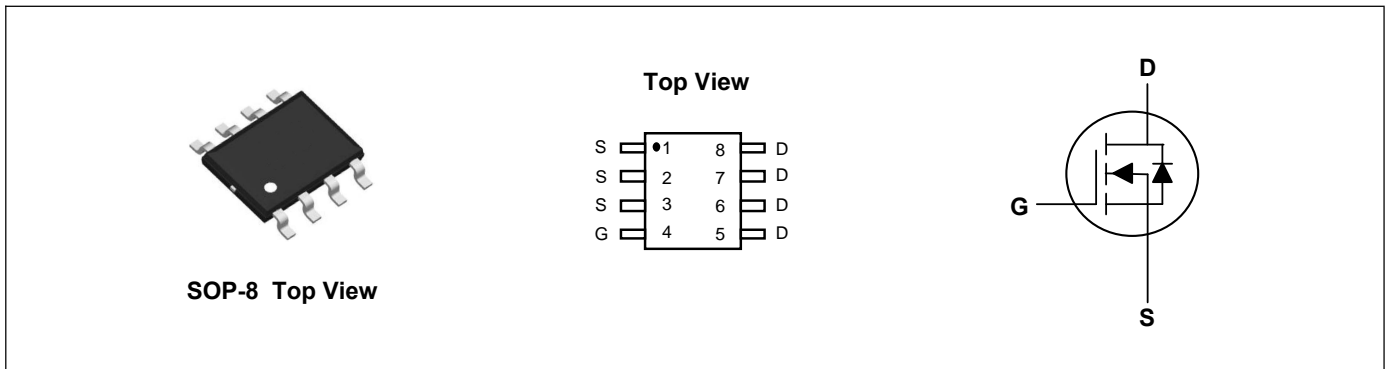
- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

Product Summary

V_{DS}	60	V
I_D	4.5	A
$R_{DS(ON)}$ (at $V_{GS}=10V$)	40	m Ω
$R_{DS(ON)}$ (at $V_{GS}=4.5V$)	50	m Ω

Applications

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



Absolute Maximum Ratings ($T_C=25^\circ C$, unless otherwise noted)

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current, $V_{GS} @ 10V^1$	$I_D @ T_A=25^\circ C$	4.5	A
Continuous Drain Current, $V_{GS} @ 10V^1$	$I_D @ T_A=70^\circ C$	3.5	A
Pulsed Drain Current ²	I_{DM}	18	A
Single Pulse Avalanche Energy ³	EAS	22	mJ
Avalanche Current	I_{AS}	21	A
Total Power Dissipation ⁴	$P_D @ T_A=25^\circ C$	1.5	W
Storage Temperature Range	T_{STG}	-55 to 150	$^\circ C$
Operating Junction Temperature Range	T_J	-55 to 150	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Unit
Thermal Resistance Junction-Ambient ¹	$R_{\theta JA}$	---	85	$^\circ C/W$
Thermal Resistance Junction-Case ¹	$R_{\theta JC}$	---	25	$^\circ C/W$

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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA	60	---	---	V
BV _{DSS} Temperature Coefficient	ΔBV _{DSS} /ΔT _J	Reference to 25°C, I _D =1mA	---	0.044	---	V/°C
Static Drain-Source On-Resistance ²	R _{DS(ON)}	V _{GS} =10V, I _D =4A	---	---	40	mΩ
		V _{GS} =4.5V, I _D =2A	---	---	50	mΩ
Gate Threshold Voltage	V _{GS(th)}	V _{GS} =V _{DS} , I _D =250uA	1.0	---	2.5	V
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)}		---	-4.8	---	mV/°C
Drain-Source Leakage Current	I _{DSS}	V _{DS} =48V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =48V, V _{GS} =0V, T _J =55°C	---	---	5	
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
Forward Transconductance	g _{fs}	V _{DS} =5V, I _D =4A	---	28.3	---	S
Gate Resistance	R _g	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	2.5	---	Ω
Total Gate Charge (10V)	Q _g	V _{DS} =48V, V _{GS} =10V, I _D =4A	---	19	---	nC
Gate-Source Charge	Q _{gs}		---	2.6	---	
Gate-Drain Charge	Q _{gd}		---	4.1	---	
Turn-On Delay Time	T _{d(on)}	V _{DD} =30V, V _{GS} =10V, R _G =3.3Ω, I _D =4A	---	3	---	ns
Rise Time	T _r		---	34	---	
Turn-Off Delay Time	T _{d(off)}		---	23	---	
Fall Time	T _f		---	6	---	
Input Capacitance	C _{iss}	V _{DS} =15V, V _{GS} =0V, f=1MHz	---	1027	---	pF
Output Capacitance	C _{oss}		---	65	---	
Reverse Transfer Capacitance	C _{rss}		---	46	---	

Drain-Source Diode Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Continuous Source Current ^{1,5}	I _S	V _G =V _D =0V, Force Current	---	---	4.5	A
Pulsed Source Current ^{2,5}	I _{SM}		---	---	18	A
Diode Forward Voltage ²	V _{SD}	V _{GS} =0V, I _S =1A, T _J =25°C	---	---	1.2	V
Reverse Recovery Time	t _{rr}	I _F =4A, di/dt=100A/μs, T _J =25°C	---	12.1	---	nS
Reverse Recovery Charge	Q _{rr}		---	6.7	---	nC

Note:

- The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- The EAS data shows Max. rating. The test condition is V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=21A
- The power dissipation is limited by 150°C junction temperature
- The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.

Typical Characteristics

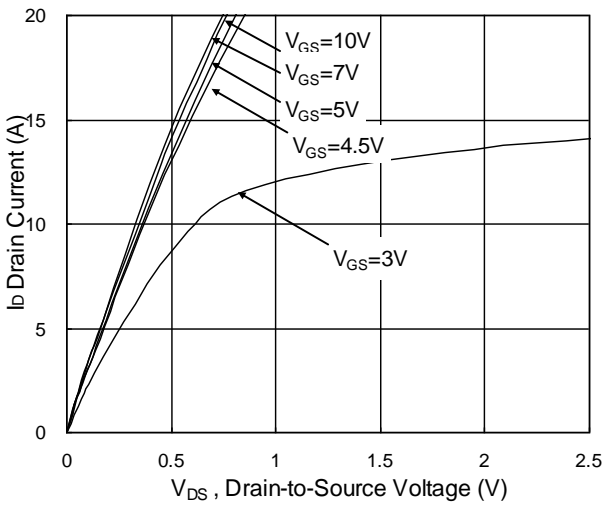


Fig.1 Typical Output Characteristics

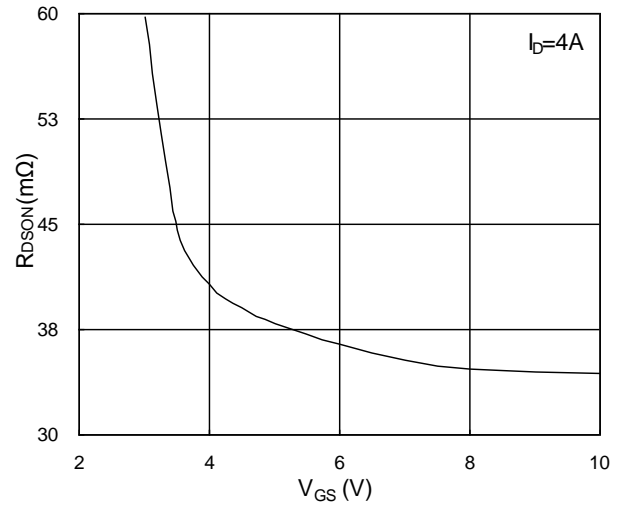


Fig.2 On-Resistance vs. Gate-Source

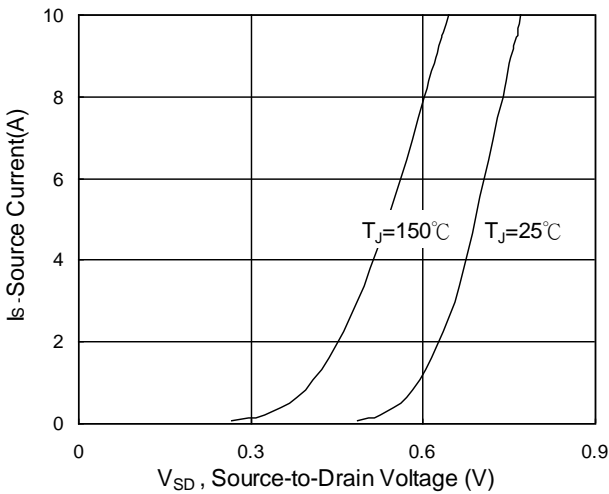


Fig.3 Forward Characteristics Of Reverse

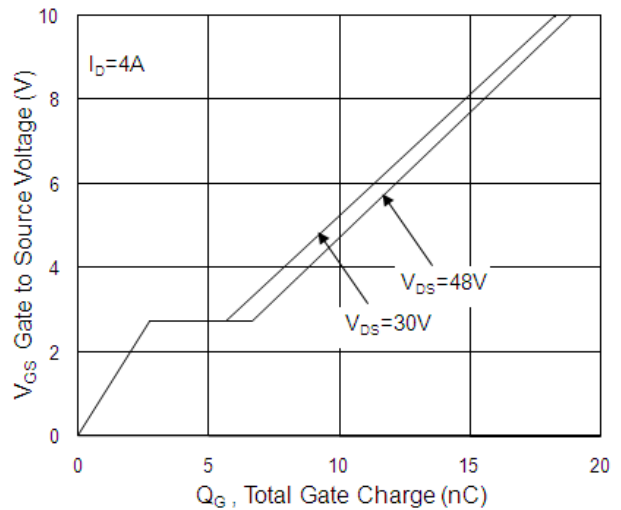


Fig.4 Gate-Charge Characteristics

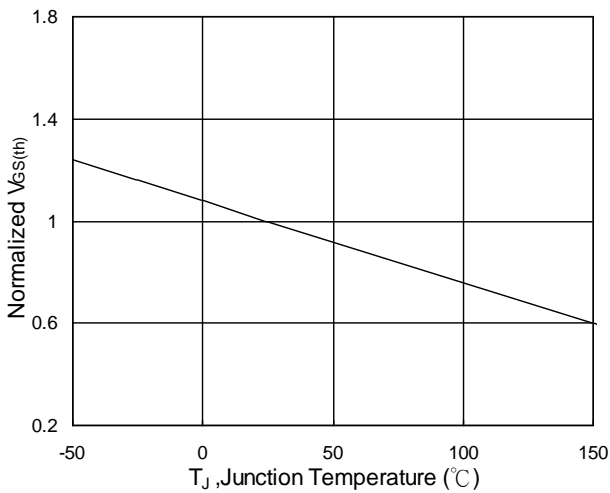


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

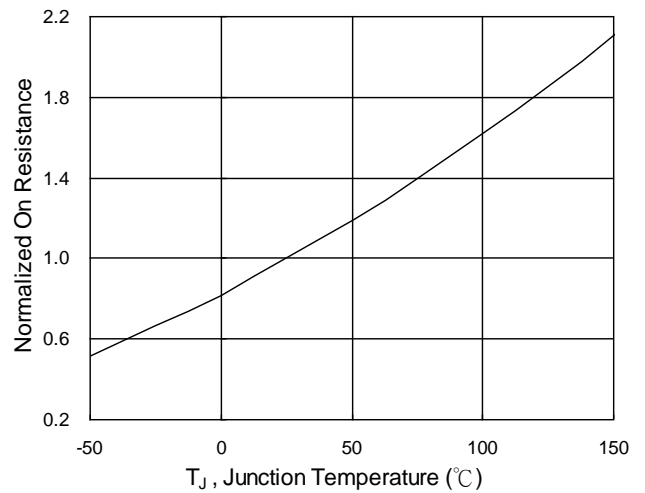


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

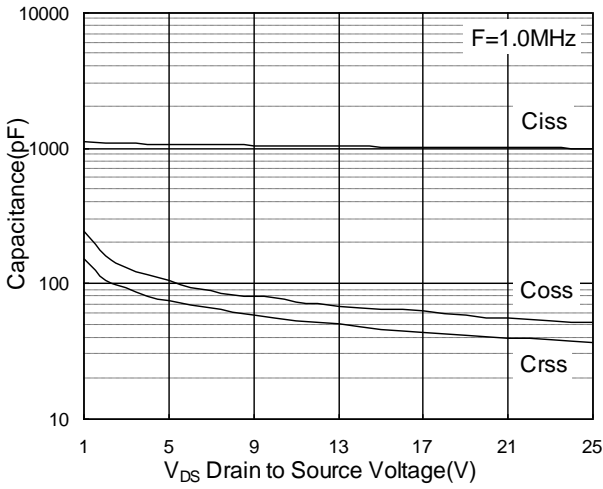


Fig.7 Capacitance

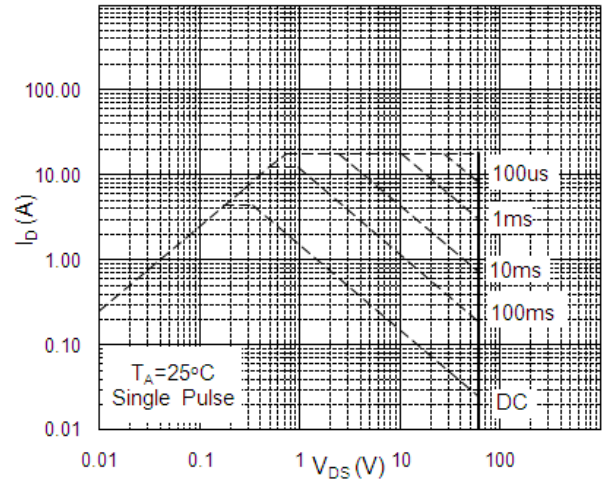


Fig.8 Safe Operating Area

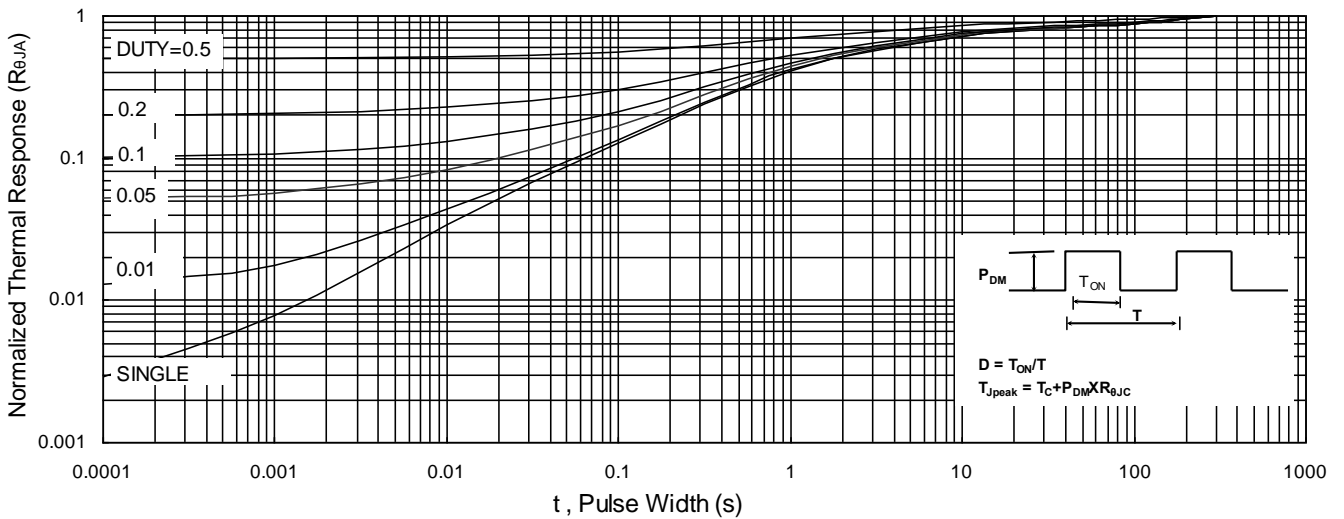


Fig.9 Normalized Maximum Transient Thermal Impedance

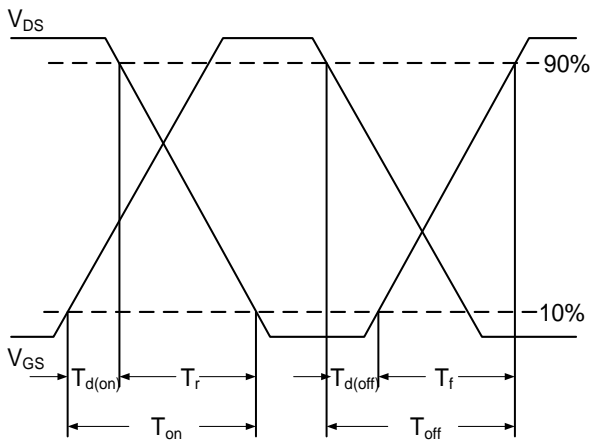


Fig.10 Switching Time Waveform

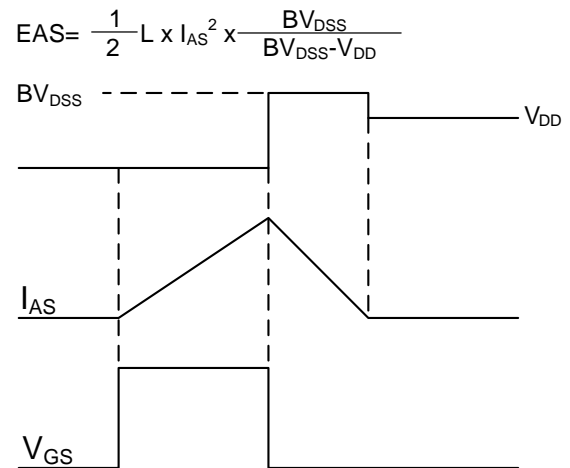
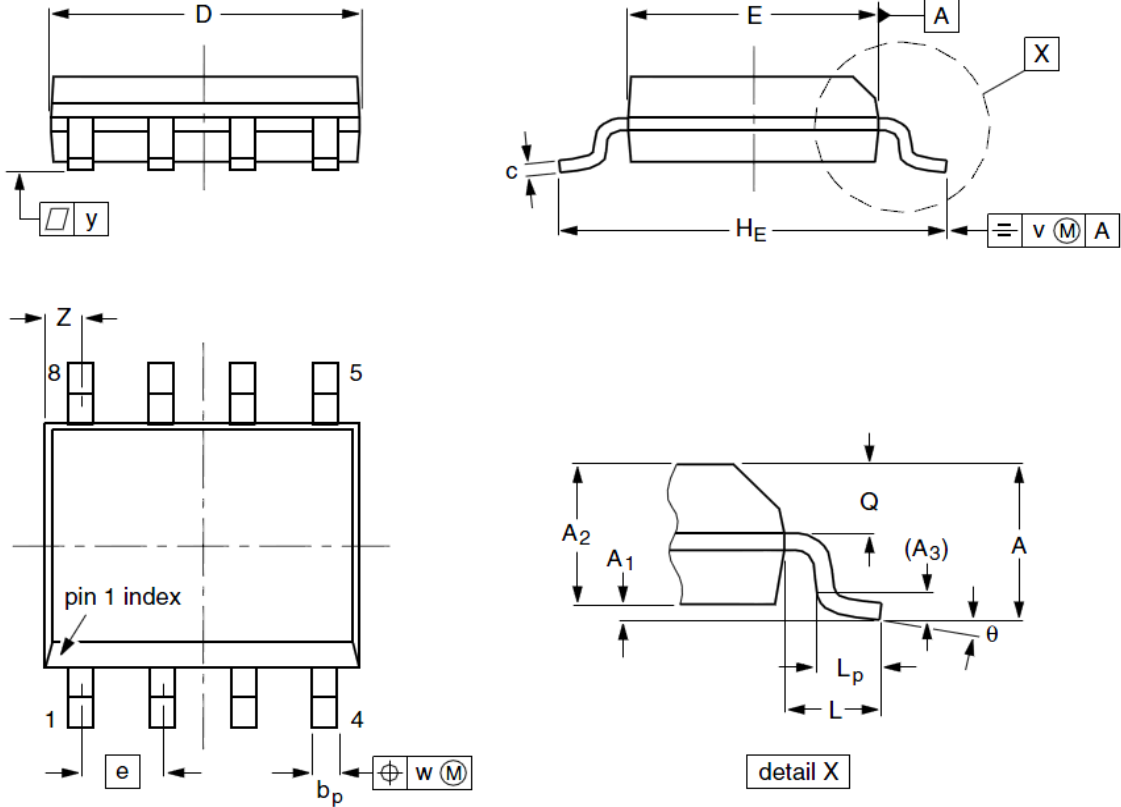


Fig.11 Unclamped Inductive Switching Waveform

SOP-8 Package Outline Dimensions



Symbol	Dimensions (unit:mm)			Symbol	Dimensions (unit:mm)		
	Min	Typ	Max		Min	Typ	Max
A	1.35	1.55	1.75	A ₁	0.10	0.18	0.25
A ₂	1.25	1.45	1.65	A ₃	--	0.25	--
b _p	0.36	0.42	0.51	c	0.19	0.22	0.25
D	4.70	4.92	5.10	E	3.80	3.90	4.00
e	--	1.27	--	H _E	5.80	6.00	6.20
L	--	1.05	--	L _p	0.40	0.68	1.00
Q	0.60	0.65	0.73	v	--	0.25	--
w	--	0.25	--	y	--	0.10	--
Z	0.30	0.50	0.70	θ	0°		8°