AT06140AL

60V N-Channel MOSFET

Features

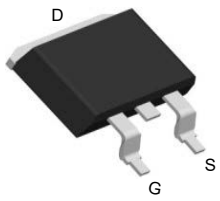
- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

Product Summary

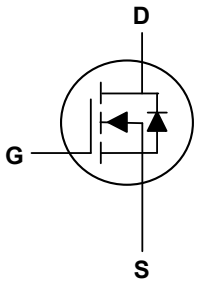
V_{DS}	60	V
I_D	140	A
$R_{DS(ON)}$ (at V_{GS}=10V)	5.2	mΩ
$R_{DS(ON)}$ (at V_{GS}=4.5V)	7	mΩ

Applications

- High Frequency Point-of-Load Synchronous Buck Converter
- Networking DC-DC Power System
- Load Switch



TO-263 Top View



Absolute Maximum Ratings(T_C=25℃, unless otherwise noted)

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current, VGS @ 10V[1]	I_D@T_C=25℃	140	A
Continuous Drain Current, VGS @ 10V[1]	I_D@T_C=100℃	90	A
Pulsed Drain Current[2]	I_{DM}	300	A
Single Pulse Avalanche Energy[3]	EAS	125	mJ
Avalanche Current	I_{AS}	50	A
Total Power Dissipation[4]	P_D@T_C=25℃	166	W
Storage Temperature Range	T_{STG}	-55 to 150	℃
Operating Junction Temperature Range	T_J	-55 to 150	℃

Thermal Characteristics

Parameter	Symbol	Typ	Max	Unit
Thermal Resistance Junction-Ambient[1]	$R_{\theta JA}$	---	62	℃/W
Thermal Resistance Junction-Case[1]	$R_{\theta JC}$	---	0.75	℃/W

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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V , I_D=250uA	60	---	---	V
Static Drain-Source On-Resistance[2]	$R_{DS(ON)}$	V_{GS}=10V , I_D=30A	---	4.3	5.2	mΩ
		V_{GS}=4.5V , I_D=20A	---	6	7	mΩ
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS} , I_D =250uA	1.2	---	2.5	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=48V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=48V , V_{GS}=0V , T_J=55℃	---	---	5	
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
Forward Transconductance	gfs	V_{DS}=10V , I_D=30A	---	75	---	S
Gate Resistance	R_g	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	0.7	---	Ω
Total Gate Charge	Q_g	V_{DS}=48V , V_{GS}=10V , I_D=25A	---	75	---	nC
Gate-Source Charge	Q_{gs}		---	15.5	---	
Gate-Drain Charge	Q_{gd}		---	20.3	---	
Turn-On Delay Time	$T_{d(on)}$	V_{DD}=30V , V_{GS}=10V , R_G=3.3Ω, I_D=30A	---	18.5	---	ns
Rise Time	T_r		---	8.8	---	
Turn-Off Delay Time	$T_{d(off)}$		---	58.8	---	
Fall Time	T_f		---	15.8	---	
Input Capacitance	C_{iss}	V_{DS}=15V , V_{GS}=0V , f=1MHz	---	4706	---	pF
Output Capacitance	C_{oss}		---	325	---	
Reverse Transfer Capacitance	C_{rss}		---	245	---	

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	---	---	140	A
Diode Forward Voltage[2]	V_{SD}	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1.2	V
Reverse Recovery Time	t_{rr}	I_F=30A , di/dt=100A/μs, T_J=25℃	---	22.9	---	nS
Reverse Recovery Charge	Q_{rr}		---	11.6	---	nC

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}=50V,V_{GS}=10V,L=0.1mH

4.The power dissipation is limited by 150℃ 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

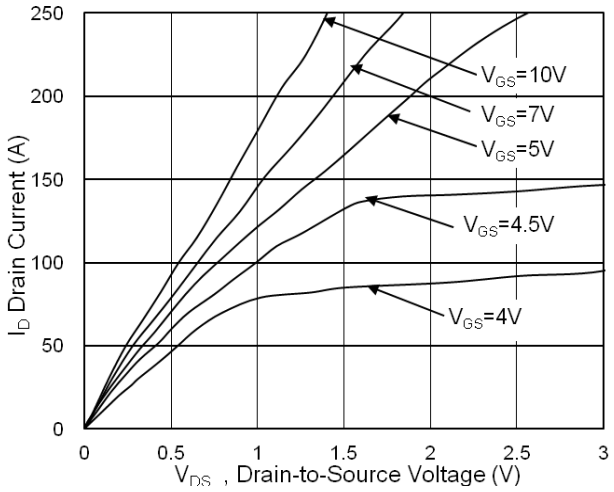


Fig.1 Typical Output Characteristics

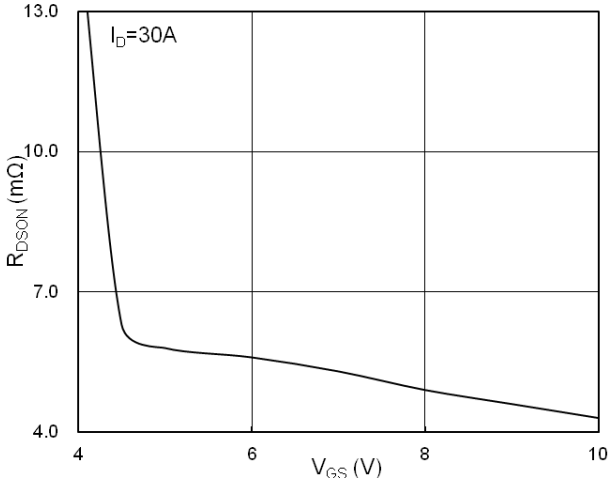


Fig.2 On-Resistance v.s Gate-Source

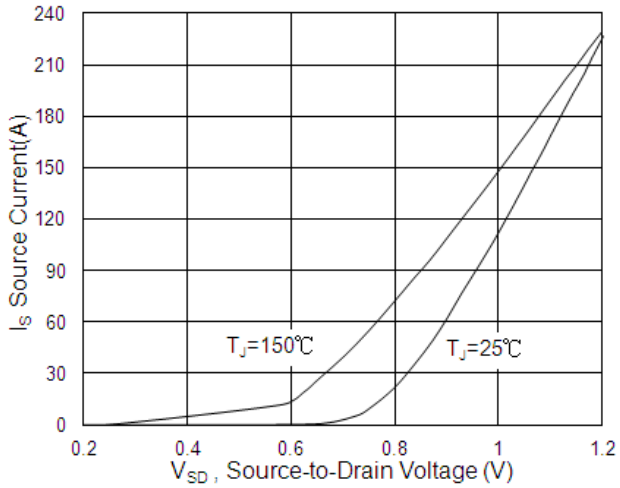


Fig.3 Forward Characteristics of Reverse

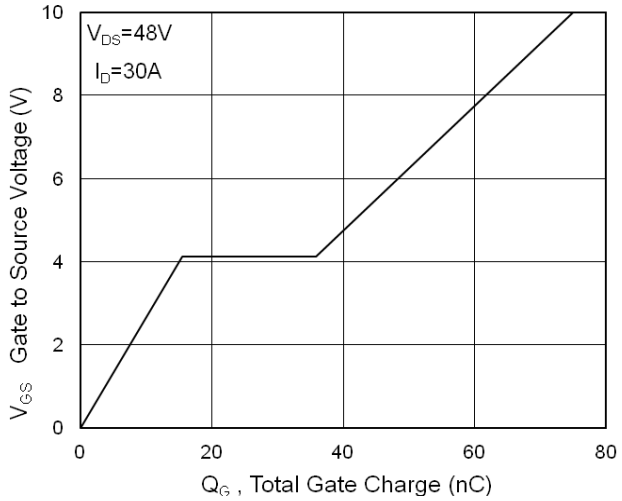


Fig.4 Gate-Charge Characteristics

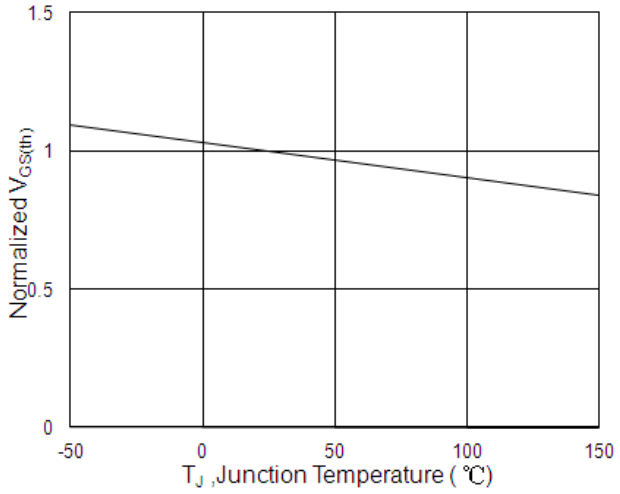


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

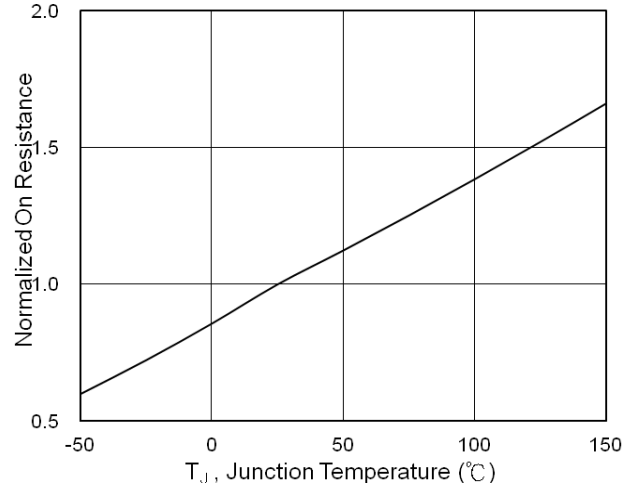


Fig.6 Normalized R_{DSON} vs. T_J

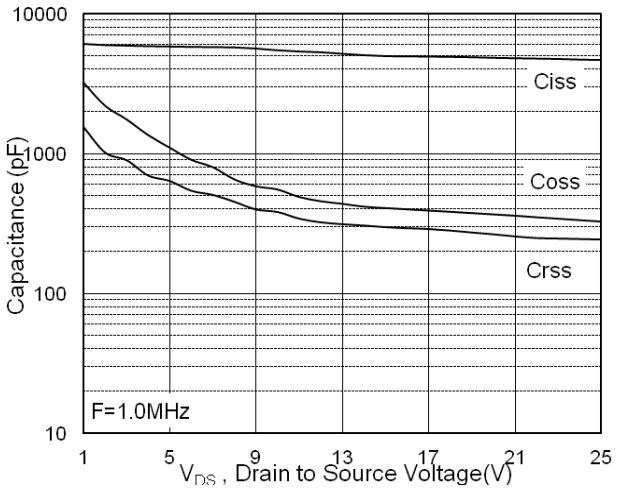


Fig.7 Capacitance

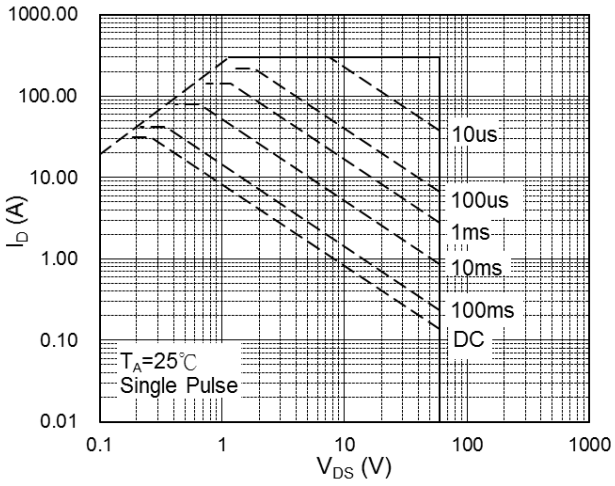


Fig.8 Safe Operating Area

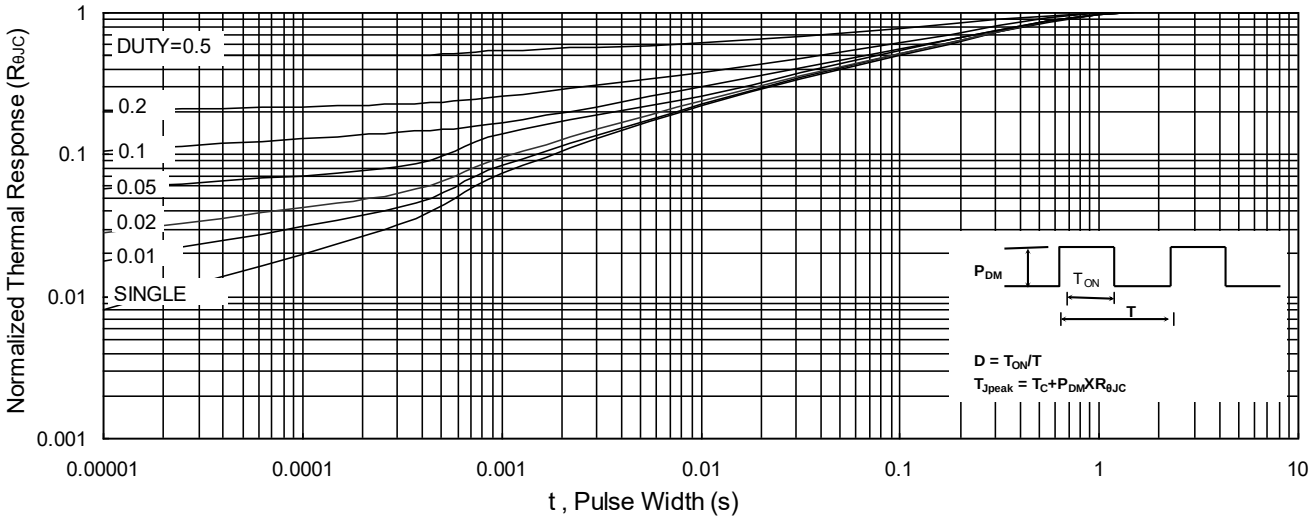


Fig.9 Normalized Maximum Transient Thermal Impedance

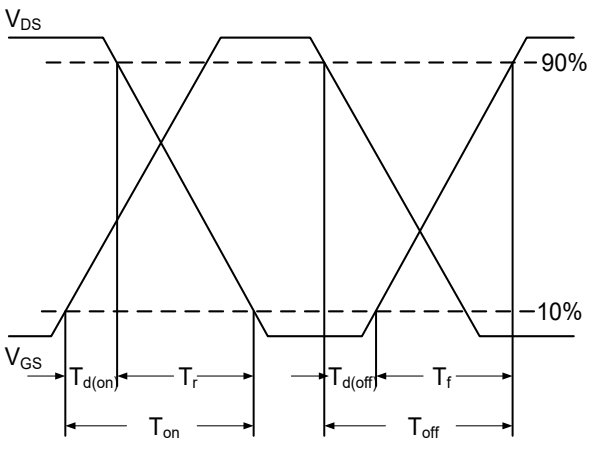


Fig.10 Switching Time Waveform

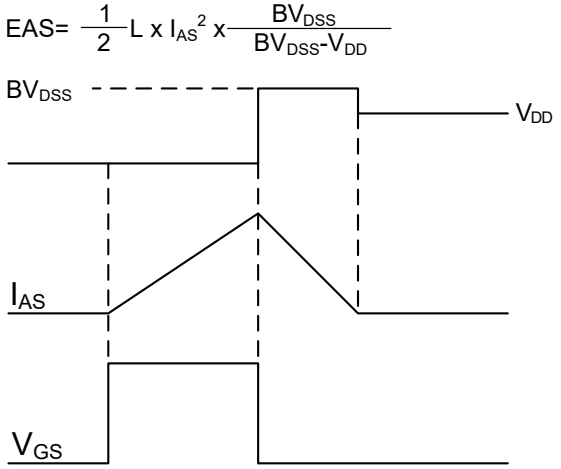
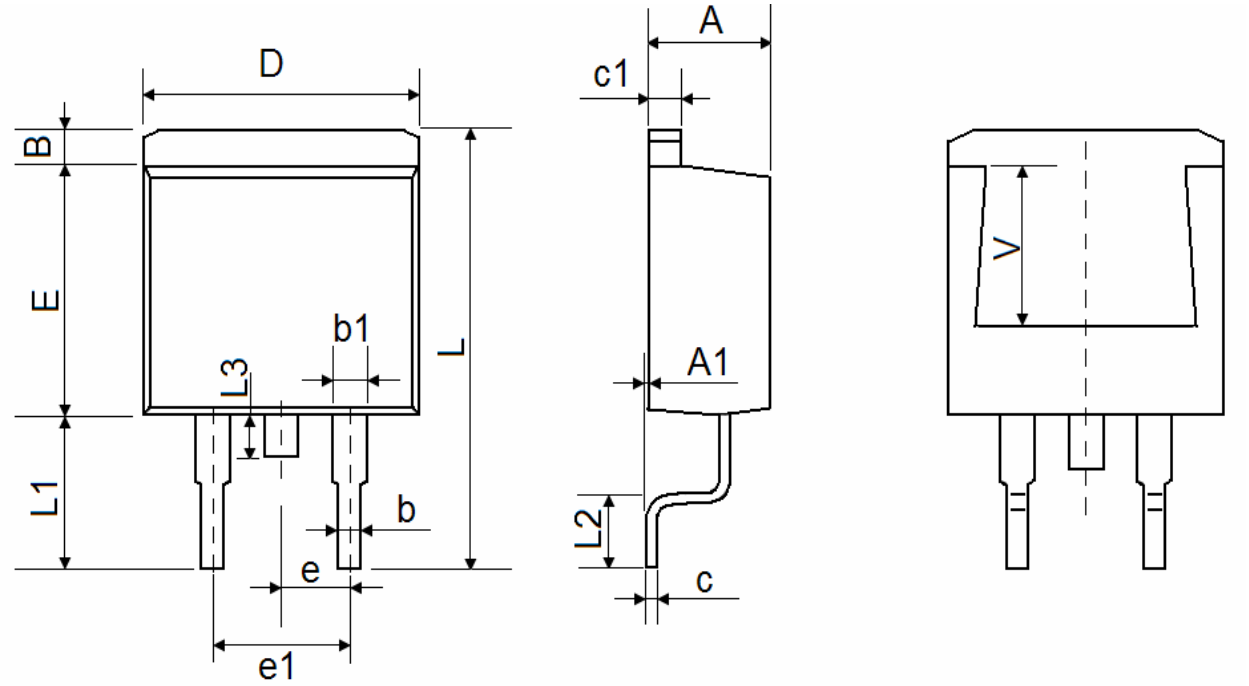


Fig.11 Unclamped Inductive Switching Waveform

TO-263 Package Outline Dimensions



Symbol	Dimensions (unit:mm)			Symbol	Dimensions (unit:mm)		
	Min	Typ	Max		Min	Typ	Max
A	4.40	4.55	4.70	**A1**	0.00	0.07	0.15
B	1.00	1.20	1.40	**b**	0.65	0.80	0.95
b1	1.10	1.15	1.37	**c**	0.30	0.40	0.53
c1	1.10	1.25	1.37	**D**	9.80	10.00	10.40
E	8.50	8.80	9.20	**e**	2.54 REF		
e1	4.90	5.10	5.40	**L**	14.80	15.20	15.70
L1	5.00	5.25	5.60	**L2**	2.05	2.45	2.80
L3	1.20	1.50	1.80	**V**	5.60 REF		