ATP06200H

60V N+P Channel MOSFET

Features

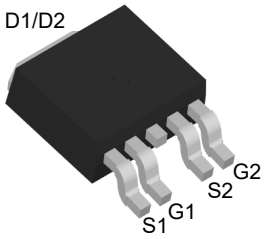
- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

Product Summary

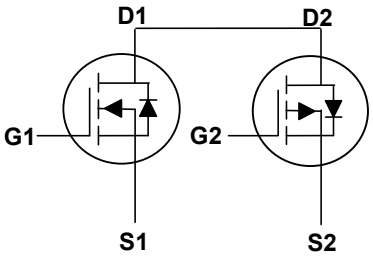
	N-Ch	P-Ch	
V_{DS}	60	-60	V
I_D	20	-12	A
$R_{DS(ON)}$ (at V_{GS}=±10V)	40	100	mΩ
$R_{DS(ON)}$ (at V_{GS}=±4.5V)	50	125	mΩ

Applications

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



TO-252-4L Top View



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

Parameter	Symbol	N-Ch	P-Ch	Units
Drain-Source Voltage	V_{DS}	60	-60	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Continuous Drain Current, VGS @ ±10V[1]	I_D@T_C=25℃	20	-12	A
Continuous Drain Current, VGS @ ±10V[1]	I_D@T_C=100℃	14	-8.5	A
Pulsed Drain Current[2]	I_{DM}	60	-30	A
Single Pulse Avalanche Energy[3]	EAS	22	29.8	mJ
Avalanche Current	I_{AS}	21	-24.4	A
Total Power Dissipation[4]	P_D@T_C=25℃	50	50	W
Storage Temperature Range	T_{STG}	-55 to 175		℃
Operating Junction Temperature Range	T_J	-55 to 175		℃

Thermal Characteristics

Parameter	Symbol	Typ	Max	Unit
Thermal Resistance Junction-Ambient[1]	$R_{\theta JA}$	---	62	℃/W
Thermal Resistance Junction-Case[1]	$R_{\theta JC}$	---	3	℃/W

N-Ch 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=15A	---	---	40	mΩ
		V_{GS}=4.5V , I_D=7A	---	---	50	mΩ
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS} , I_D =250uA	1.0	---	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	uA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
Forward Transconductance	gfs	V_{DS}=5V , I_D=15A	---	25.3	---	S
Total Gate Charge	Q_g	V_{DS}=48V , V_{GS}=10V , I_D=15A	---	19	---	nC
Gate-Source Charge	Q_{gs}		---	2.5	---	
Gate-Drain Charge	Q_{gd}		---	5	---	
Turn-On Delay Time	$T_{d(on)}$	V_{DD}=30V , V_{GS}=10V , R_G=3.3Ω, I_D=15A	---	2.8	---	ns
Rise Time	T_r		---	16.6	---	
Turn-Off Delay Time	$T_{d(off)}$		---	21.2	---	
Fall Time	T_f		---	5.6	---	
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	---	---	10	A
Diode Forward Voltage[2]	V_{SD}	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1.2	V

Note:

1.The data tested by surface mounted on a 1 inch^2 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

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.

N-Ch Typical Characteristics

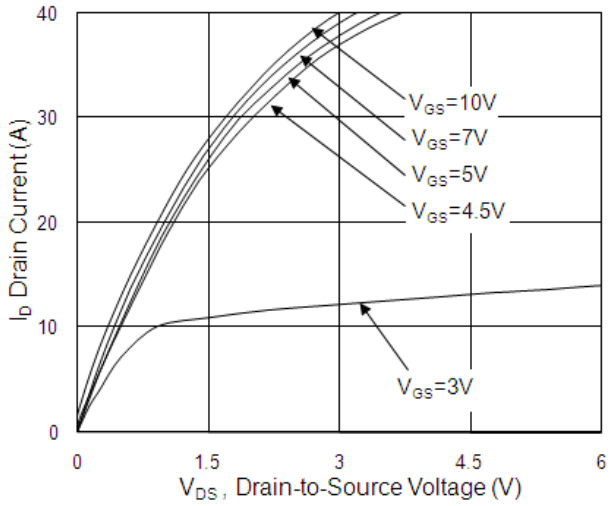


Fig.1 Typical Output Characteristics

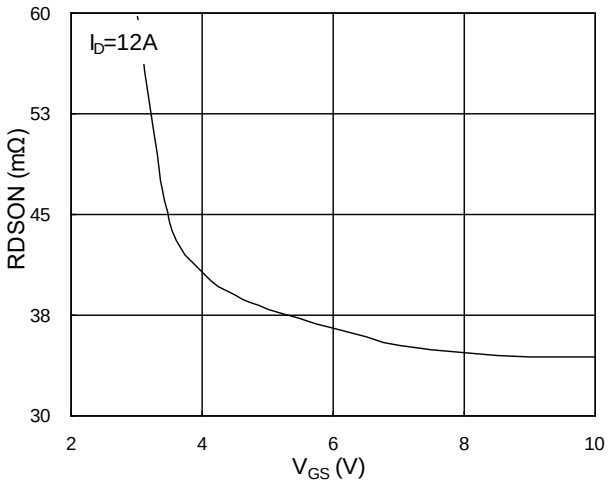


Fig.2 On-Resistance vs. G-S Voltage

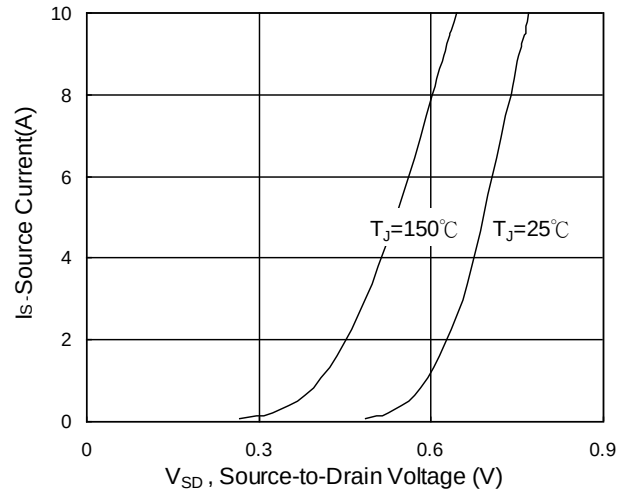


Fig.3 Source Drain Forward Characteristics

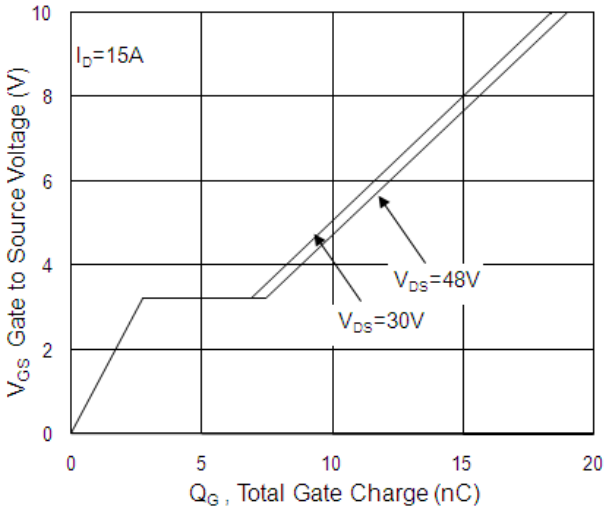


Fig.4 Gate-Charge Characteristics

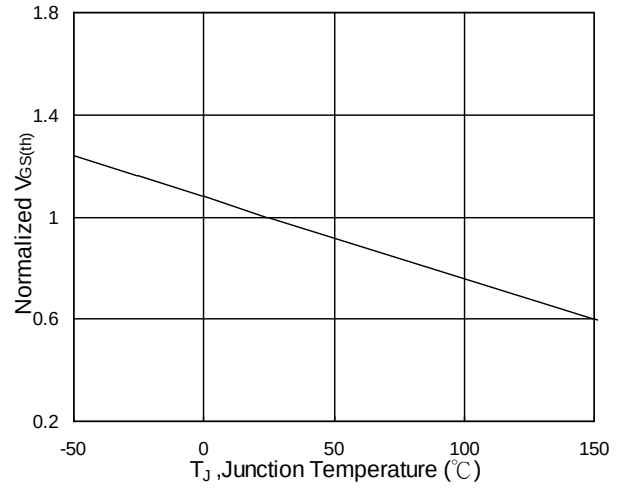


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

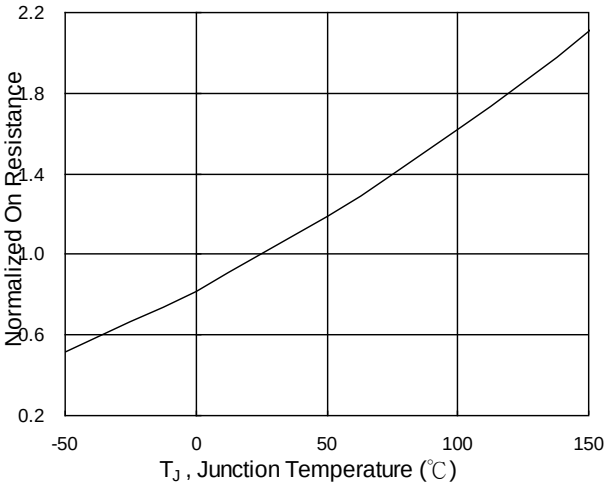


Fig.6 Normalized R_{DSON} vs. T_J

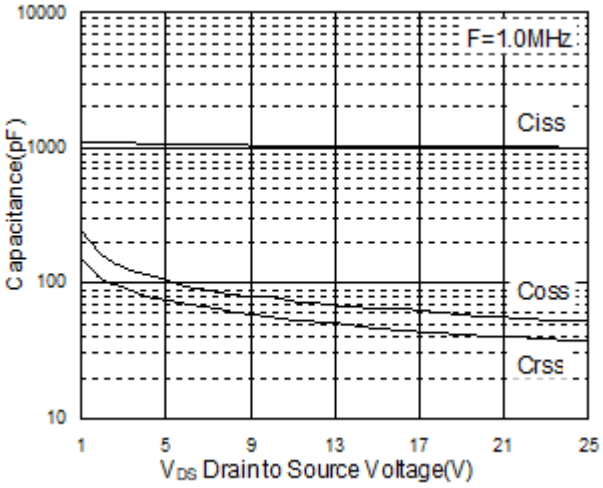


Fig.7 Capacitance

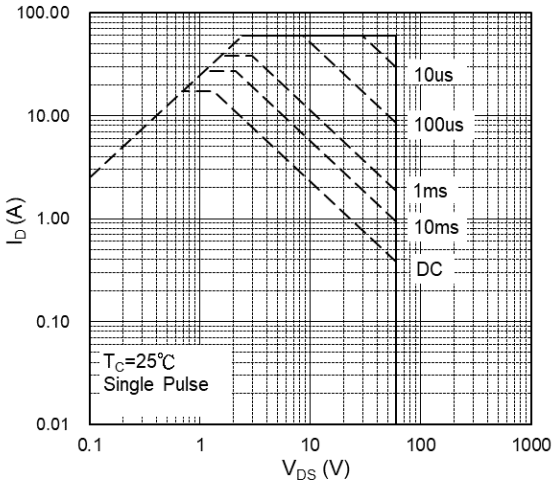


Fig.8 Safe Operating Area

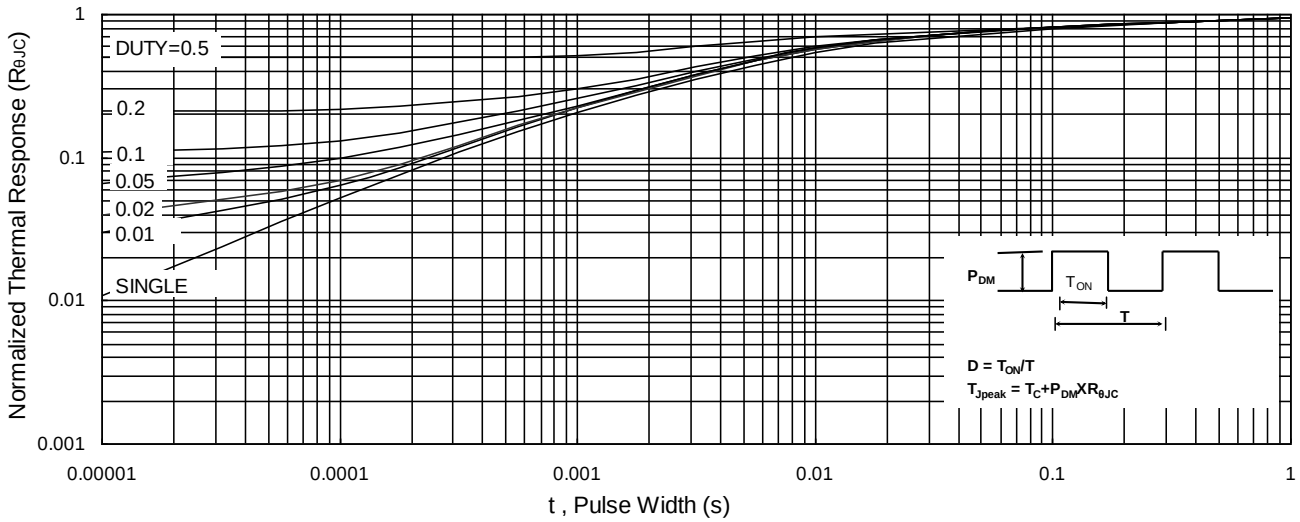


Fig.9 Normalized Maximum Transient Thermal Impedance

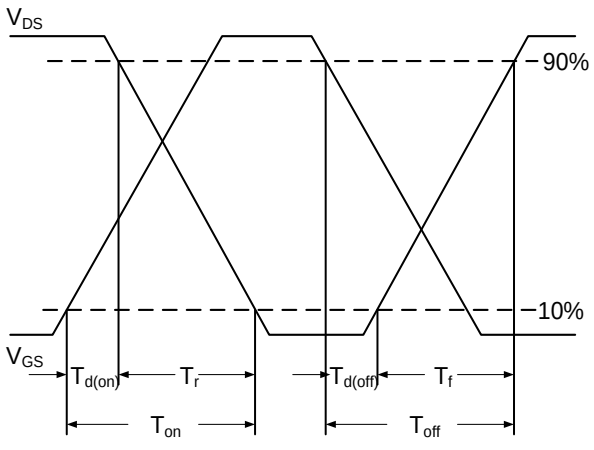


Fig.10 Switching Time Waveform

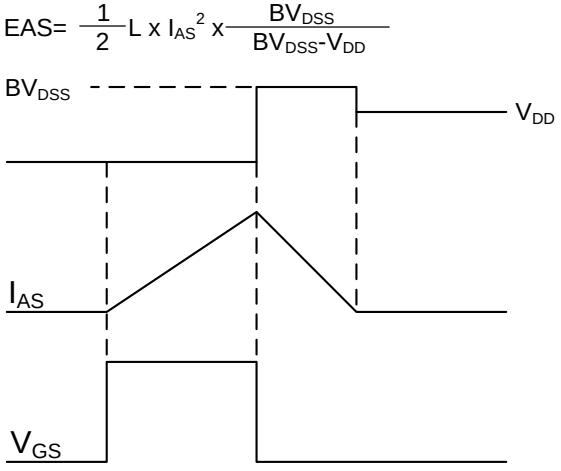


Fig.11 Unclamped Inductive Switching Waveform

P-Ch 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=-10A	---	---	100	mΩ
		V_{GS}=-4.5V , I_D=-5A	---	---	125	mΩ
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS} , I_D =-250uA	-1.0	---	-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	uA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
Forward Transconductance	gfs	V_{DS}=-5V , I_D=-4A	---	8.7	---	S
Total Gate Charge	Q_g	V_{DS}=-12V , V_{GS}=-4.5V , I_D=-6A	---	11.8	---	nC
Gate-Source Charge	Q_{gs}		---	1.9	---	
Gate-Drain Charge	Q_{gd}		---	6.5	---	
Turn-On Delay Time	$T_{d(on)}$	V_{DD}=-15V , V_{GS}=-10V , R_G=3.3Ω, I_D=-1A	---	8.8	---	ns
Rise Time	T_r		---	19.6	---	
Turn-Off Delay Time	$T_{d(off)}$		---	47.2	---	
Fall Time	T_f		---	9.6	---	
Input Capacitance	C_{iss}	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	1080	---	pF
Output Capacitance	C_{oss}		---	73	---	
Reverse Transfer Capacitance	C_{rss}		---	50	---	

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	---	---	-10	A
Diode Forward Voltage[2]	V_{SD}	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1	V

Note:

1.The data tested by surface mounted on a 1 inch^2 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

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.

P-Ch Typical Characteristics

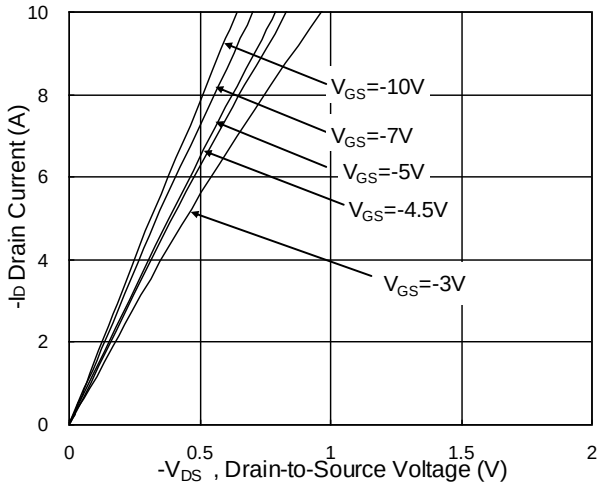


Fig.1 Typical Output Characteristics

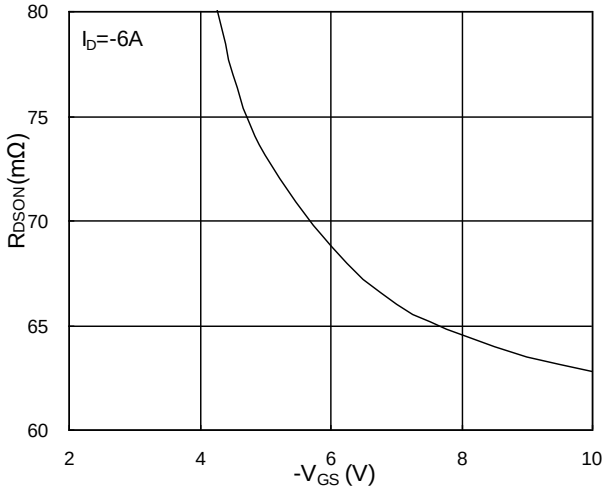


Fig.2 On-Resistance vs. G-S Voltage

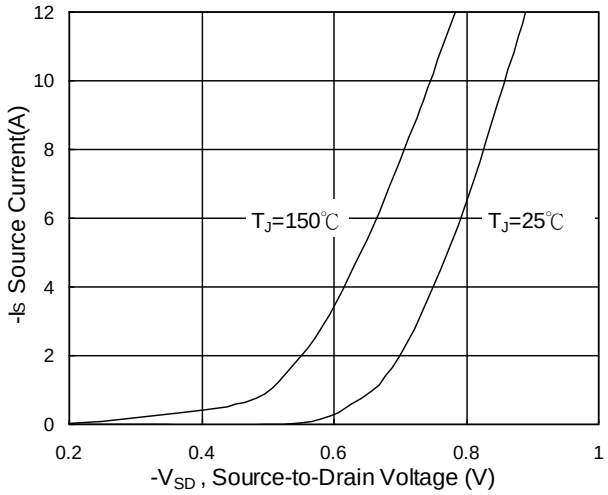


Fig.3 Source Drain Forward Characteristics

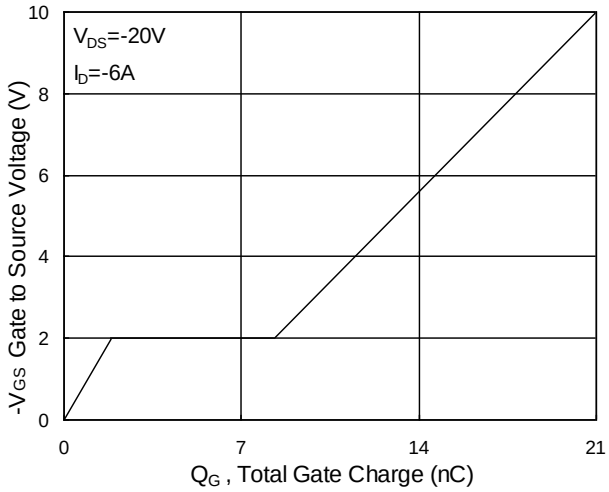


Fig.4 Gate-Charge Characteristics

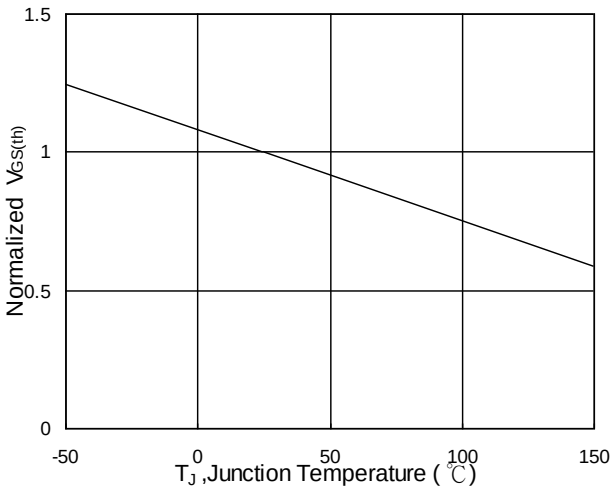


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

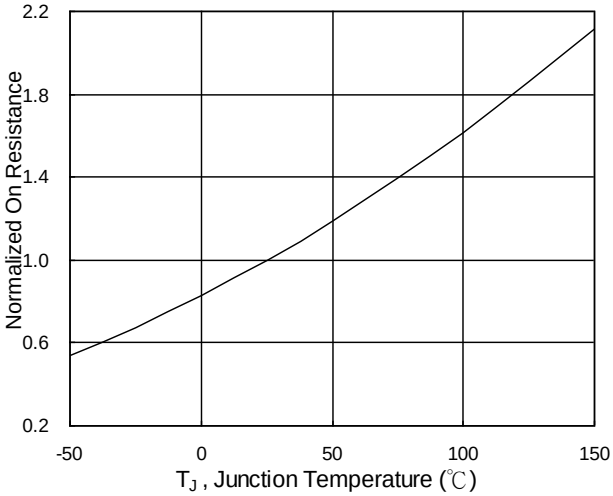


Fig.6 Normalized R_{DSON} vs. T_J

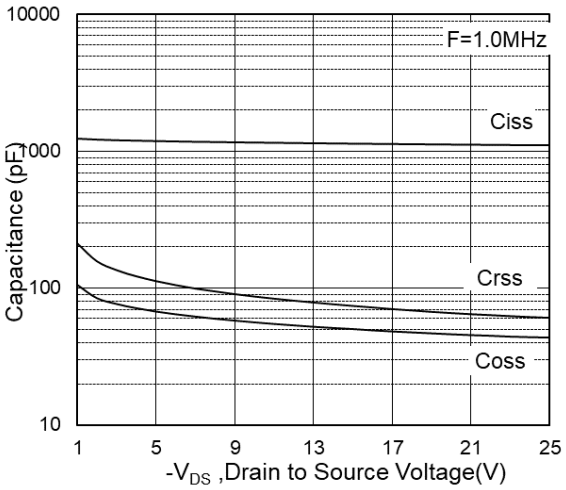


Fig.7 Capacitance

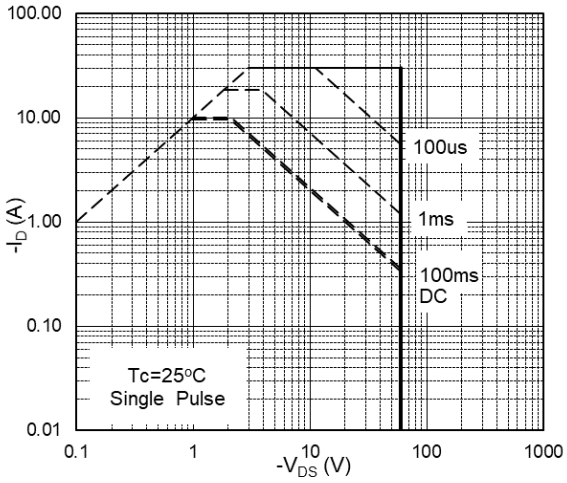


Fig.8 Safe Operating Area

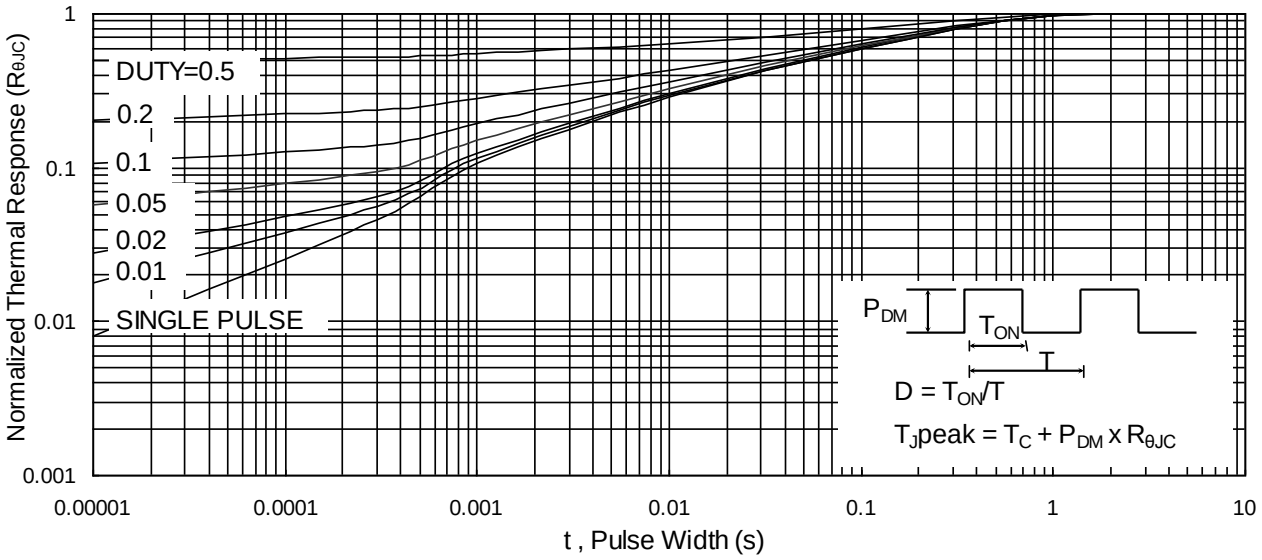


Fig.9 Normalized Maximum Transient Thermal Impedance

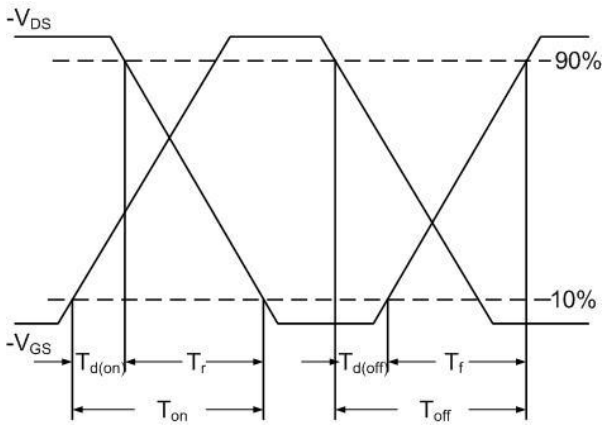


Fig.10 Switching Time Waveform

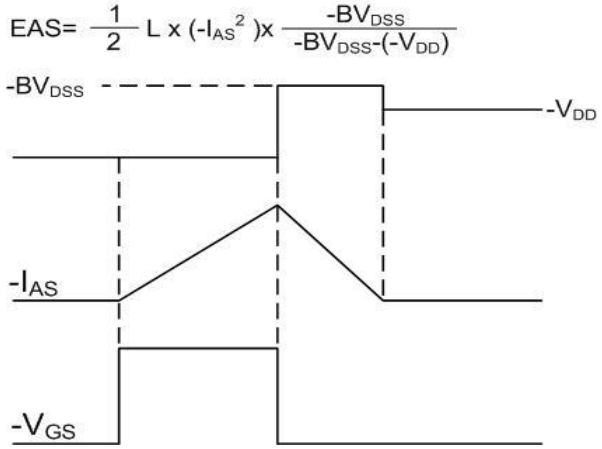
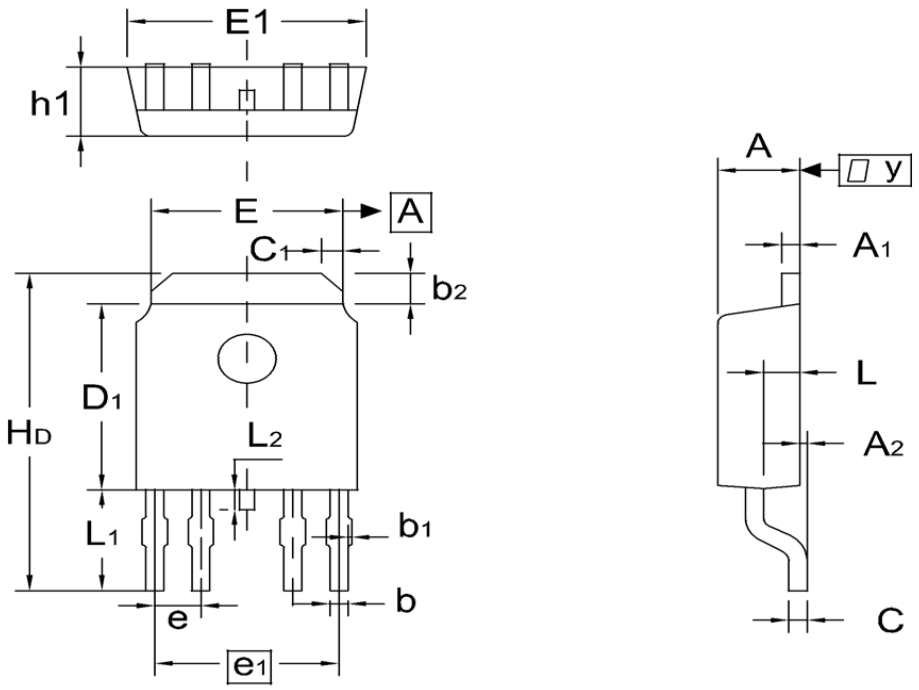


Fig.11 Unclamped Inductive Switching Waveform

TO-252-4L Package Outline Dimensions



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	2.1	2.3	2.5	**A_1**	0.4	0.5	0.6
A2	--	--	0.3	**b**	0.4	0.5	0.6
b_1	--	--	0.1	**b_2**	0.8	1.0	1.2
C	0.4	0.5	0.6	**C_1**	0.4	0.6	0.8
D_1	5.7	6.1	6.5	**E**	5.0	5.3	5.6
E_1	6.3	6.6	6.9	**e**	--	1.27	--
e_1	--	5.08	--	**H_D**	9.6	10.0	10.4
h_1	2.1	2.3	2.5	**L**	0.80	1.0	1.2
L_1	2.6	2.9	3.2	**L_2**	0.35	0.65	0.95