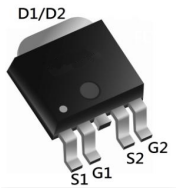
60V N-Channel MOSFET
-60V P-Channel MOSFET

●General Description

The N-ch and P-ch MOSFET LH4559A has the low RDS(on),low gate charge,fast switching and excellent avalanche characteristics.This device is suitable for fast charge and lighting.



TO-252-4

VDS =60V

RDS(ON)=30mΩ

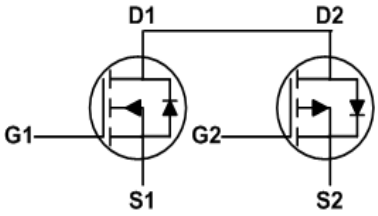
ID =7.0A

VDS =-60V

RDS(ON)=71mΩ

ID =-6.0A

■ RoHS COMPLIANT



●Features

- ■Green Device Available
- ■Super Low Gate Charge
- ■Excellent CdV/dt effect d ecline
- ■Advanced high cell density Tren ch technology

●Ordering Information:

Part number	LH4559A
Package	TO252-4
Basic ordering unit (pcs)	2500
Normal Package Material Ordering Code	LH4559AT7-TO252-4-TAP
Halogen Free Ordering Code	LH4559AT7-TO252-4-TAP-HF

●Absolute Maximum Ratings（TC =25℃）

PARAMETER	SYMBOL	Value		UNIT
		N-ch	P-ch	
Drain-Source Breakdown Voltage	BV_{DSS}	60	-60	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Continuous Drain Current	I_D @TA=25℃	7.0	-6.0	A
	I_D@TA=100℃	5.5	-4.5	
Pulsed drain current	I_{DM}	11	-8.5	A
Avalanche Energy	E_{AS}	25.5	35.3	mJ
Avalanche Current	I_{AS}	22.6	-26.6	W
Power Dissipation @TA=25℃	P_D	1.5	1.5	
Operating Temperature	T_J	-55~+150	-55~+150	℃
Storage Temperature	T_{STG}	-55~+150	-55~+150	℃

●N-Channel Electronic Characteristics

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V, I_D=250uA	60	--	--	V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS}=VDS,I_D=250uA	1.2	--	2.5	V
Drain-source On Resistance[2]	$R_{DS(ON)}$	V_{GS} =10V, I_D=4A		30	35	mΩ
		V_{GS} =4.5V, I_D=2A	--	37	43	
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}=5V,I_D=4A	--	21	--	S
Input Capacitance	Ciss	V_{GS}=0V, V_{DS}=15V f = 1.0MHz	-- --	1378	-- --	pF
Output Capacitance	Coss		--	86	--	
Reverse Transfer Capacitance	Crss		--	64	--	ns
Gate Resistance	Rg	VDS=0V , VGS=0V , f=1MHz	--	3.2	---	Ω
Total Gate Charge (10V)	Qg	VDS=48V , VGS=4.5V , ID=4A	--	12.6	---	nC
Gate-Source Charge	Qgs		--	3.2	--	
Gate-Drain Charge	Qgd		--	6.3	--	
Turn-On Delay Time	Td(on)	VDD=30V , VGS=10V , RG=3.3Ω ID=14A	--	8	--	nS
Rise Time	Tr		--	14.2	--	
Turn-Off Delay Time	Td(off)		--	24.4	---	
Fall Time	Tf		--	4.6	7.0	
Continuous Source Current[1,5]	IS	VG=VD=0V,Force Current	--	--	70	A
Pulsed Source Current[2,5]	I_{SD}		--	--	12	
Diode Forward Voltage2	V_{SD}	VGS=0V , IS=1A , TJ=25℃	--	--	1.2	V

Notes:

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 VDD=25V,VGS=10V,L=0.1mH,IAS=22.6A
4. The power dissipation is limited by 150℃ junction temperature
5. The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

●P-Channel Electronic Characteristics

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V, I_D=-250uA	-60	--	--	V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS}=VDS,I_D=-250uA	-1.2	--	-2.5	V
Drain-source On Resistance[2]	$R_{DS(ON)}$	V_{GS} =-10V, I_D=4A		71	87	mΩ
		V_{GS} =-4.5V, I_D=2A	--	90	120	
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}=-5V,I_D=-3A	--	15	--	S
Input Capacitance	Ciss	V_{GS}=0V, V_{DS}=-15V f = 1.0MHz	-- --	1447	-- --	pF
Output Capacitance	Coss		--	97.3	--	
Reverse Transfer Capacitance	Crss		--	70	--	ns
Gate Resistance	Rg	VDS=0V , VGS=0V , f=1MHz	--	13.5	---	Ω
Total Gate Charge (10V)	Qg	VDS=-48V , VGS=-4.5V , ID=-3A	--	9.86	---	nC
Gate-Source Charge	Qgs		--	3.1	--	
Gate-Drain Charge	Qgd		--	2.95	--	
Turn-On Delay Time	Td(on)	VDD=-15V , VGS=-10V , RG=3.3Ω ID=-1A	--	28.8	--	nS
Rise Time	Tr		--	19.8	--	
Turn-Off Delay Time	Td(off)		--	60.8	---	
Fall Time	Tf		--	7.2	7.0	
Continuous Source Current[1,5]	IS	VG=VD=0V,Force Current	--	--	-6.0	A
Pulsed Source Current[2,5]	I_{SD}		--	--	-11	
Diode Forward Voltage2	V_{SD}	VGS=0V , IS=-1A , TJ=25℃	--	--	-1.2	V

Notes:

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 VDD=-25V,VGS=-10V,L=0.1mH,IAS=-26.6A
4. The power dissipation is limited by 150℃ junction temperature
5. The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

●Thermal Characteristics

PARAMETER	SYMBOL	MAX	UNIT
		SOP-8	
Thermal Resistance Junction-case[1]	Rth_{JC}	36	℃/W
Thermal Resistance Junction-ambient[1]	Rth_{JA}	85	℃/W

●N-ChannelTypical Characteristics

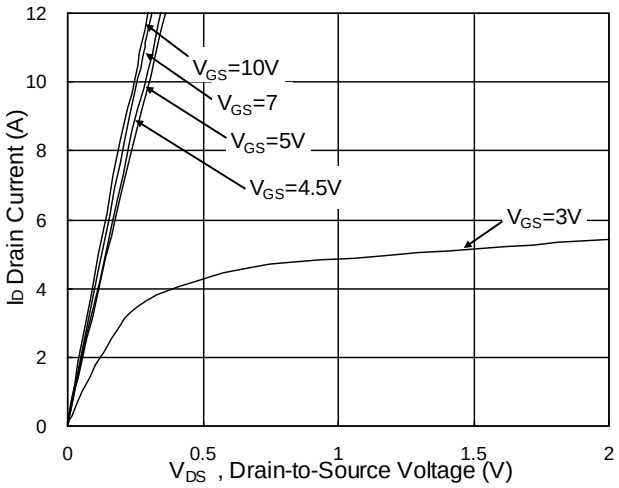


Fig.1 Typical Output Characteristics

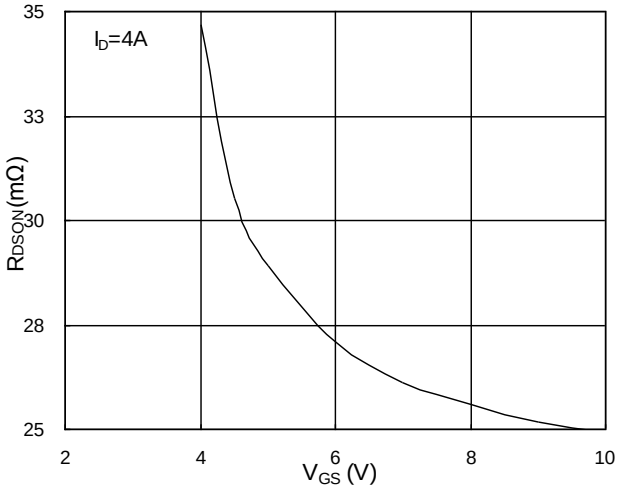


Fig.2 On-Resistance v.s Gate-Source

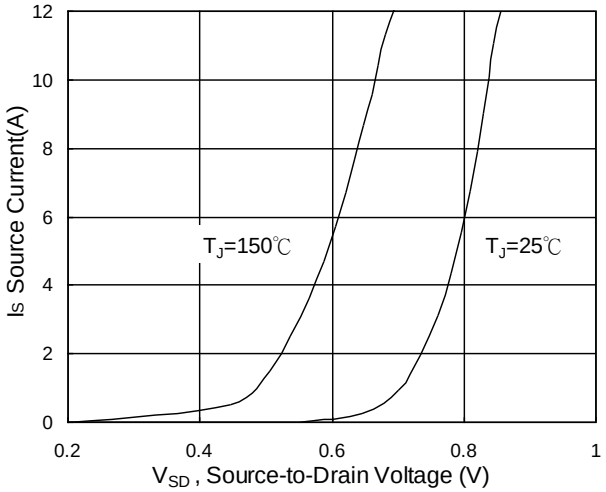


Fig.3 Forward Characteristics of Reverse

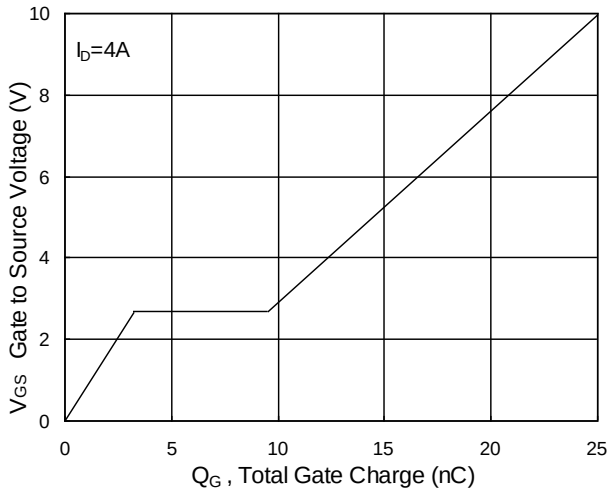


Fig.4 Gate-Charge Characteristics

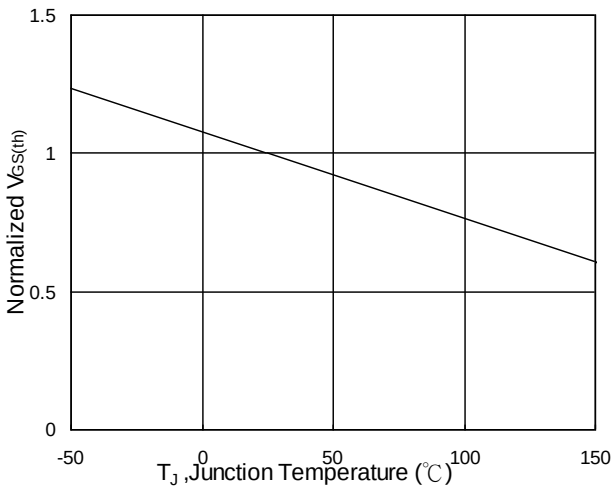


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

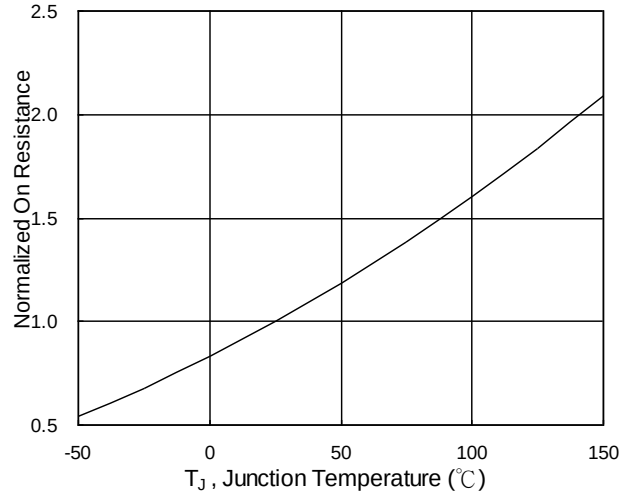


Fig.6 Normalized R_{DSON} v.s T_J

•N-ChannelTypical Characteristics（cont.）

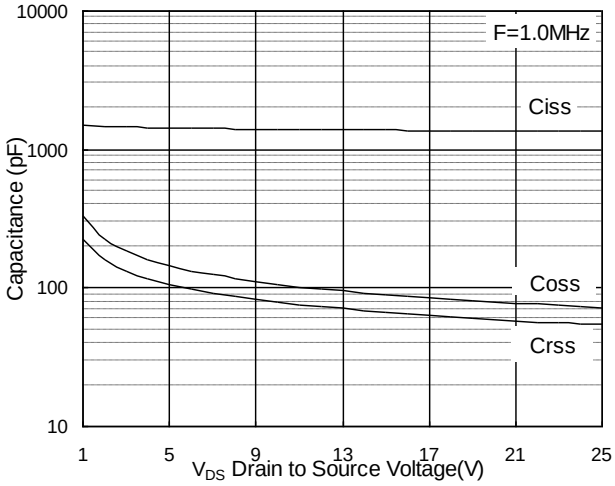


Fig.7 Capacitance

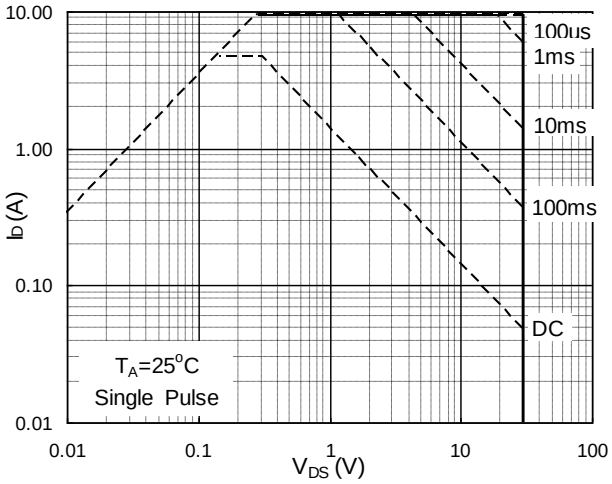


Fig.8 Safe Operating Area

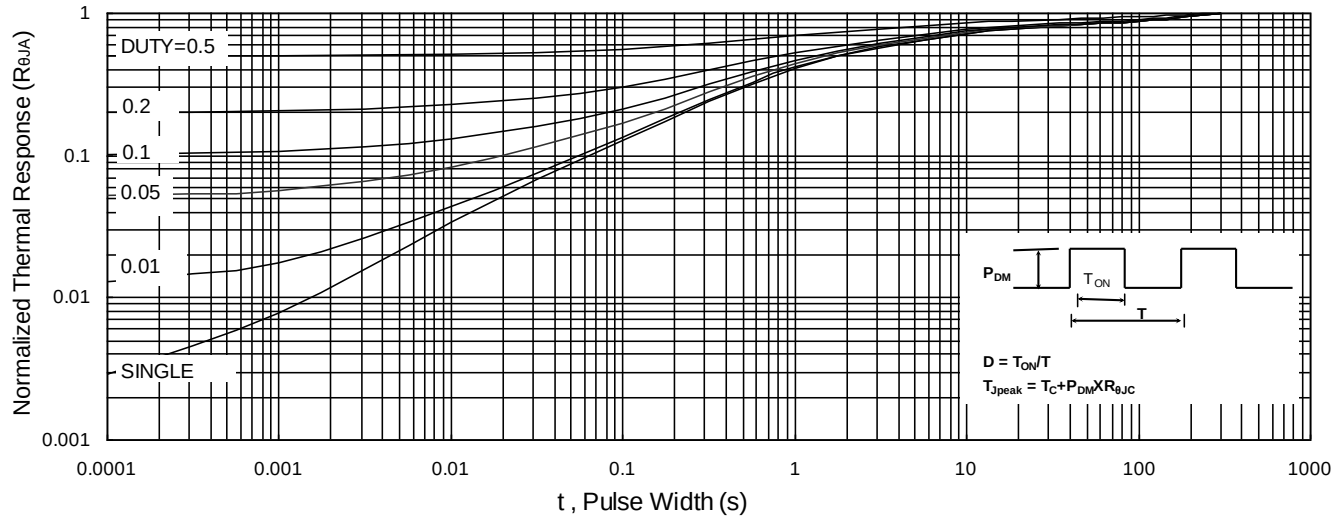


Fig.9 Normalized Maximum Transient Thermal Impedance

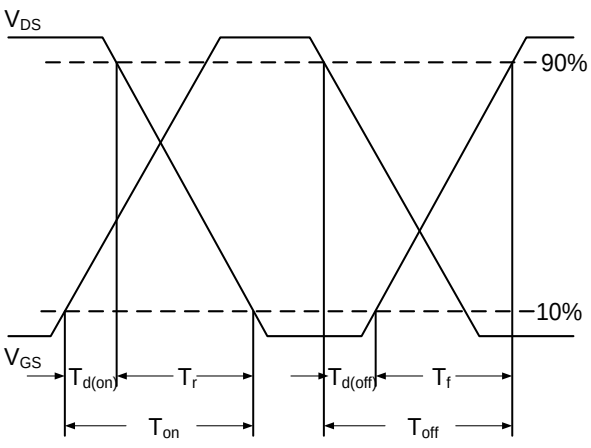


Fig.10 Switching Time Waveform

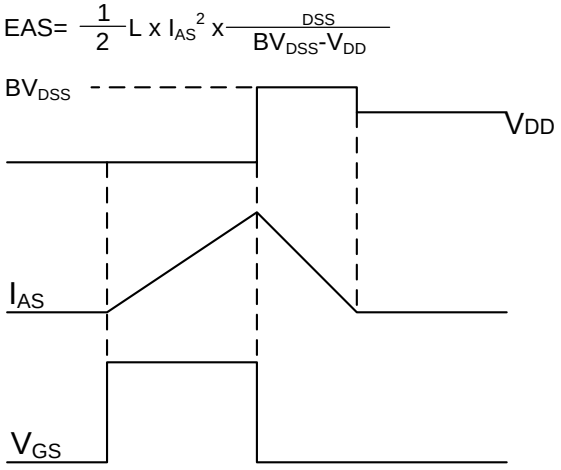


Fig.11 Unclamped Inductive Waveform

•P-ChannelTypical Characteristics（cont.）

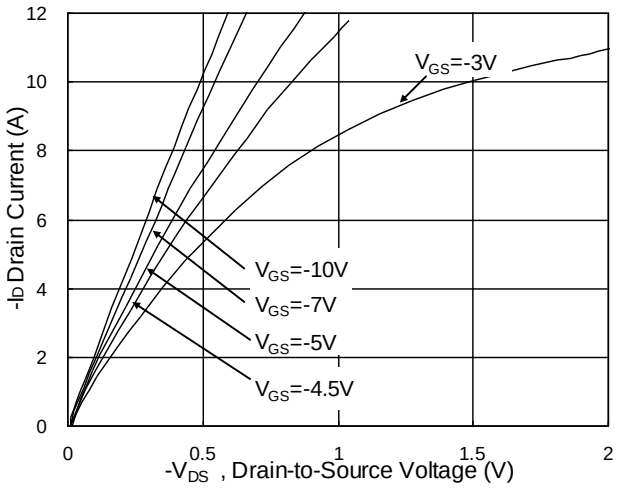


Fig.1 Typical Output Characteristics

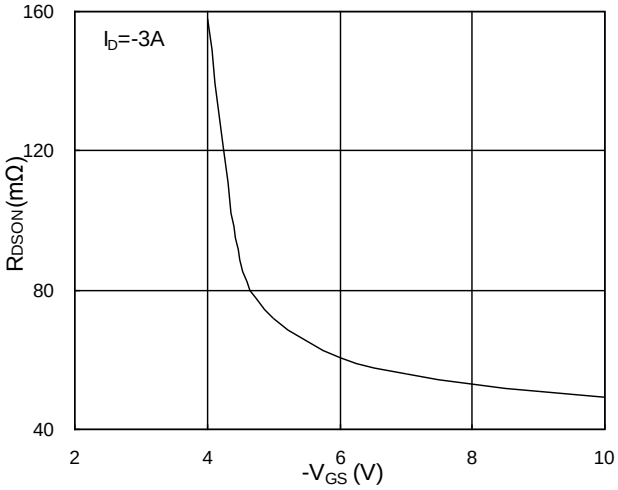


Fig.2 On-Resistance v.s Gate-Source

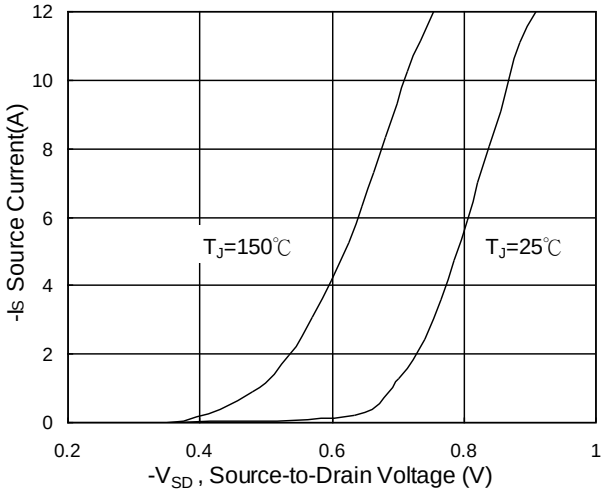


Fig.3 Forward Characteristics of Reverse

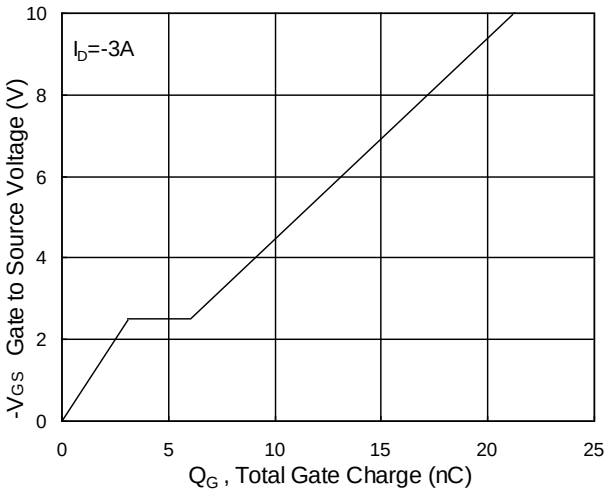


Fig.4 Gate-Charge Characteristics

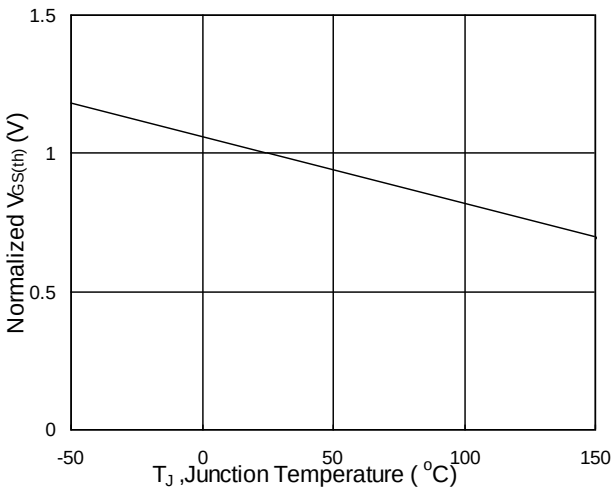


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

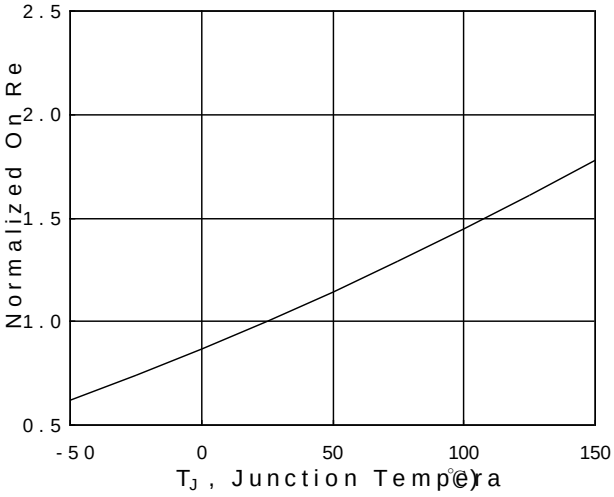


Fig.6 Normalized R_{DSON} v.s T_J

•P-ChannelTypical Characteristics（cont.）

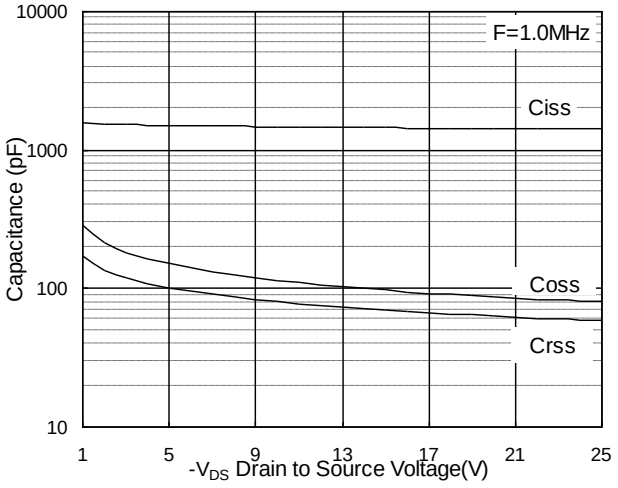


Fig.7 Capacitance

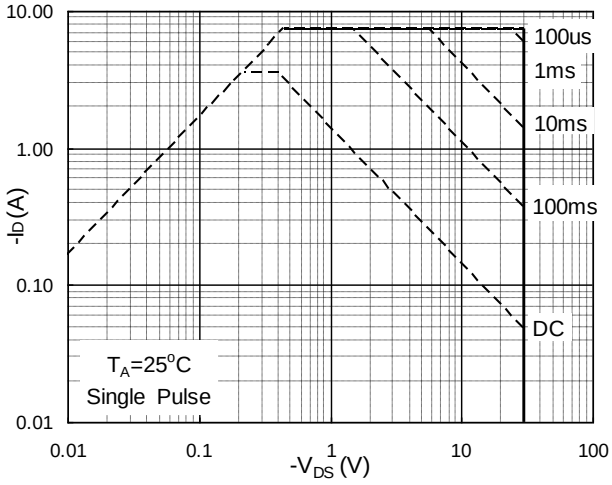
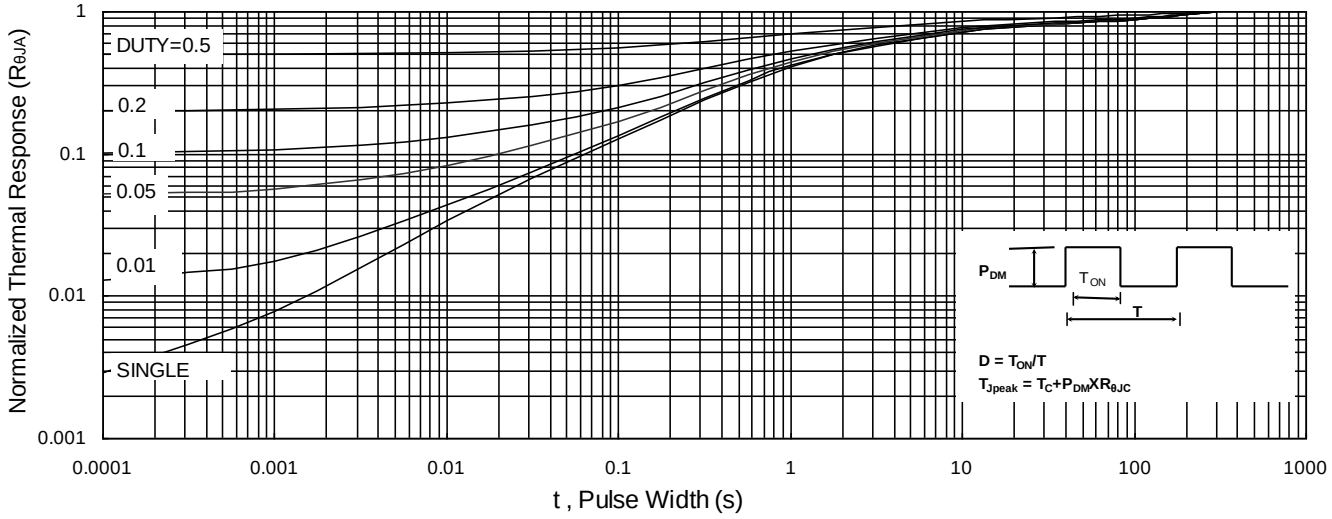


Fig.8 Safe Operating Area



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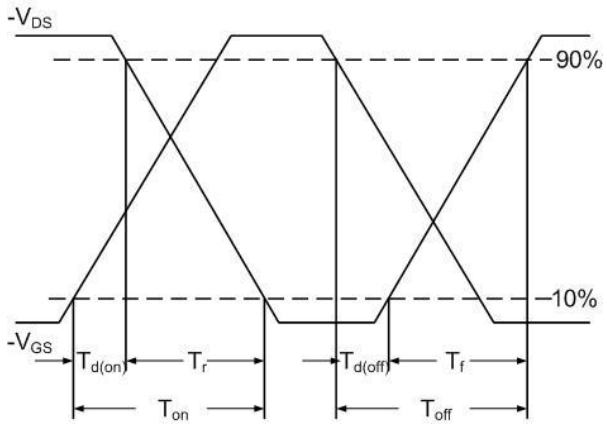

Fig.10 Switching Time Waveform

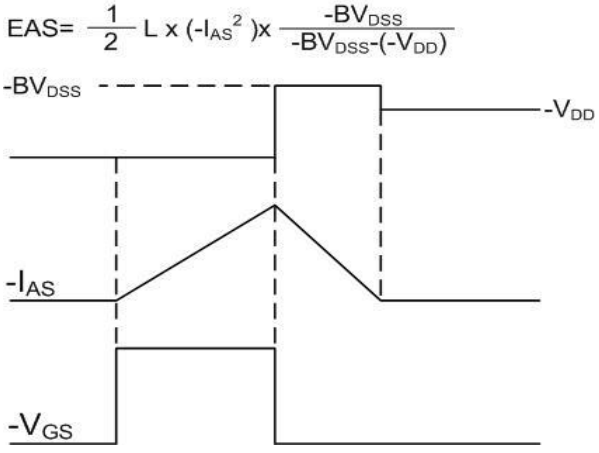

Fig.11 Unclamped Inductive Waveform