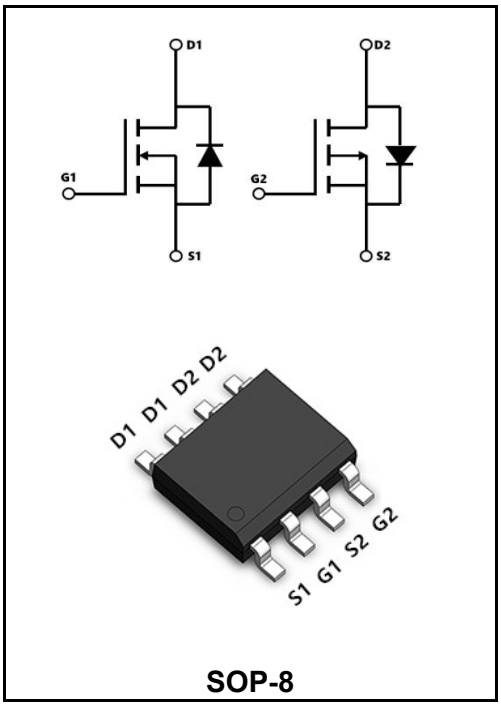
40V N+P-Channel Enhancement Mode MOSFET

MAIN CHARACTERISTICS

I_D	8.0A
V_{DS}	40V
R_{DSON}-typ(@V_{GS}=10V)	＜24mΩ(Typ:17 mΩ)
R_{DSON}-typ(@V_{GS}=4.5V)	＜35mΩ(Typ:25 mΩ)
I_D	-7.5A
V_{DS}	-40V
R_{DSON}-typ(@V_{GS}=-10V)	＜37.5mΩ(Typ:30 mΩ)
R_{DSON}-typ(@V_{GS}=-4.5V)	＜46mΩ(Typ:37 mΩ)



SOP-8

DESCRIPTION

The YFW4614S uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

APPLICATION

- Wireless charging
- Boost driver
- Brushless motor

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

Characteristics	Symbols	Value		Units
		N-Ch	P-Ch	
Drain-Source Voltage	V_{DS}	40	-40	V
Gate - Source Voltage	V_{GS}	±20	±20	V
Continuous drain current@ 10V[1] , T_A=25 ℃	I_D	8.0	-7.5	A
Continuous Drain Current, VGS @ 10V[1], T_A=70 ℃	I_D	5.2	-4.8	A
Pulsed Drain Current[2]	I_{DM}	23	-22	A
Single Pulse Avalanche Energy[3]	E_{AS}	16.2	39	mJ
Avalanche Current	I_{AS}	18	-28	A
Total Power Dissipation[4] T_A=25 ℃	P_D	2.6	2.6	W
Operating Junction Temperature Range	T_J	-55 to +150		°C
Storage Temperature Range	T_{STG}	-55 to +150		°C
Thermal Resistance Junction-Ambient [1]	$R_{\theta JA}$	105		°C/W
Thermal Resistance Junction-Case[1]	$R_{\theta JC}$	48		°C/W

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

Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	BV_{DSS}	40	---	---	V
BVDSS Temperature Coefficient	Reference to 25℃, I_D=1mA	△BV_{DSS}/△TJ	---	0.034	---	V/°C
Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=8A	$R_{DS(ON)}$	---	17	24	mΩ
	V_{GS}=4.5V , I_D=5A		---	25	35	
Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	$V_{GS(th)}$	1.0	1.5	2.5	V
$V_{GS(th)}$ Temperature Coefficient		△$V_{GS(th)}$	---	-4.56	---	mV/℃
Drain-Source Leakage Current	V_{DS}=32V , V_{GS}=0V , T_J=25℃	I_{DSS}	---	---	1	uA
	V_{DS}=32V , V_{GS}=0V , T_J=55℃		---	---	5	
Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	I_{GSS}	---	---	±100	nA
Forward Transconductance	V_{DS}=5V , I_D=5A	gfs	---	14	---	S
Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	R_g	---	2.6	---	Ω
Total Gate Charge (4.5V)	V_{DS}=20V V_{GS}=4.5V I_D=5A	Q_g	---	5.5	---	nC
Gate-Source Charge		Q_{gs}	---	1.25	---	
Gate-Drain Charge		Q_{gd}	---	2.5	---	
Turn-On Delay Time	V_{DD}=20V V_{GS}=10V R_G=3.3Ω I_D=1A	$t_{d(on)}$	---	8.9	---	ns
Rise Time		T_r	---	2.2	---	
Turn-Off Delay Time		$t_{d(OFF)}$	---	41	---	
Fall Time		t_f	---	2.7	---	
Input Capacitance	V_{DS}=15V V_{GS}=0V f=1MHz	C_{iss}	---	593	---	pF
Output Capacitance		C_{oss}	---	76	---	
Reverse Transfer Capacitance		C_{rss}	---	56	---	
Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	I_S	---	---	8.0	A
Pulsed Source Current[2,5]		I_{SM}	---	---	23	A
Diode Forward Voltage[2]	V_{GS}=0V , I_S=1A , T_J=25℃	V_{SD}	---	---	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,IAS=10A

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-Electrical Characteristics (TJ=25℃, unless otherwise noted)

Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	BV_{DSS}	-40	---	---	V
BV_{DSS} Temperature Coefficient	Reference to 25℃, I_D=-1mA	$\triangle BV_{DSS}/\triangle T_J$	---	-0.02	---	V/°C
Static Drain-Source On-Resistance[2]	V_{GS}=-10V , I_D=-8A	$R_{DS(ON)}$	---	30	37.5	mΩ
	V_{GS}=-4.5V , I_D=-5A		---	37	46	
Gate Threshold Voltage	V_{GS}=V_{DS} I_D =-250uA	$V_{GS(th)}$	-1.0	-1.6	-2.5	V
$V_{GS(th)}$ Temperature Coefficient		$\triangle V_{GS(th)}$	---	3.72	---	mV/°C
Drain-Source Leakage Current	V_{DS}=-32V , V_{GS}=0V , T_J=25℃	I_{DSS}	---	---	1	uA
	V_{DS}=-32V , V_{GS}=0V , T_J=55℃		---	---	5	
Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	I_{GSS}	---	---	±100	nA
Forward Transconductance	V_{DS}=-5V , I_D=-6A	gfs	---	13	---	S
Total Gate Charge (-4.5V)	V_{DS}=-20V V_{GS}=-4.5V I_D=-6A	Q_g	---	11.5	---	nC
Gate-Source Charge		Q_{gs}	---	3.5	---	
Gate-Drain Charge		Q_{gd}	---	3.3	---	
Turn-On Delay Time	V_{DD}=-15V V_{GS}=-10V R_G=3.3Ω I_D=-1A	$t_{d(on)}$	---	22	---	ns
Rise Time		T_r	---	15.7	---	
Turn-Off Delay Time		$t_{d(OFF)}$	---	59	---	
Fall Time		t_f	---	5.5	---	
Input Capacitance	V_{DS}=-15V V_{GS}=0V f=1MHz	C_{iss}	---	1243	---	pF
Output Capacitance		C_{oss}	---	97	---	
Reverse Transfer Capacitance		C_{rss}	---	80	---	
Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	I_S	---	---	-7.5	A
Pulsed Source Current[2,5]		I_{SM}	---	---	-22	A
Diode Forward Voltage[2]	V_{GS}=0V , I_S=-1A , T_J=25℃	V_{SD}	---	---	-1.2	V

Note :

1、The data tested by surface mo unted 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,I_{AS}=-10A

4、The power dissipation is limited by 150℃ junction temperature

5 、The data is theoretically the same as I_D and IDM , in real applications , should be limited by total power dissipation.

N-Channel Typical Characteristics

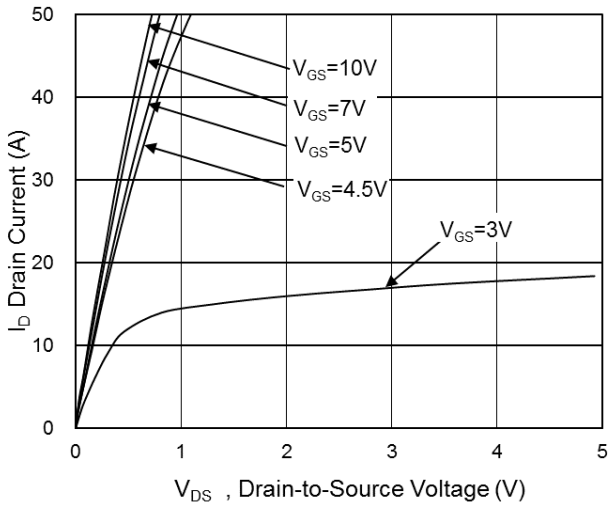


Fig.1 Typical Output Characteristics

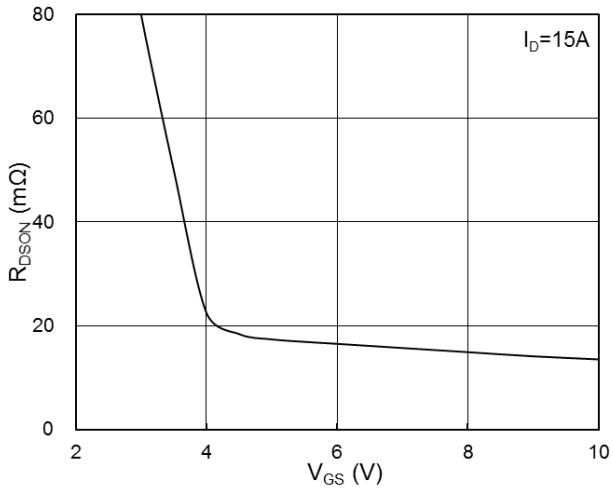


Fig.2 On-Resistance vs. G-S Voltage

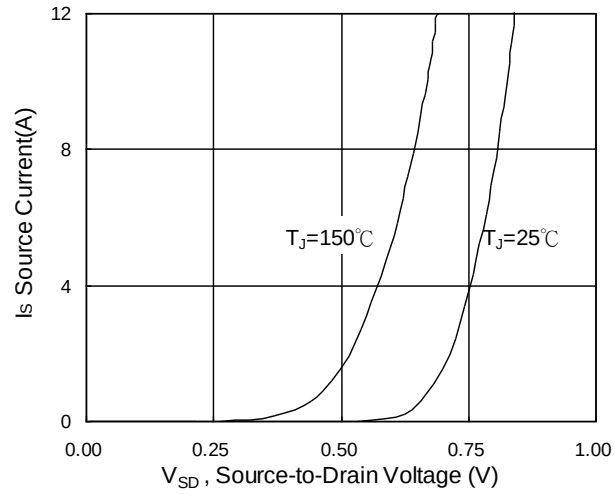


Fig.3 Forward Characteristics of Reverse

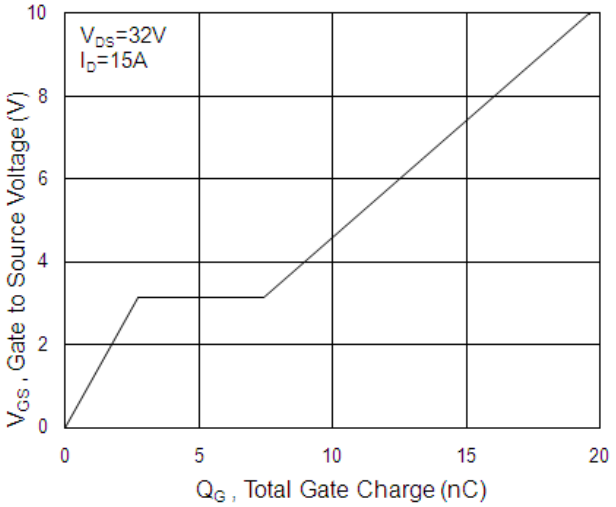


Fig.4 Gate-Charge Characteristics

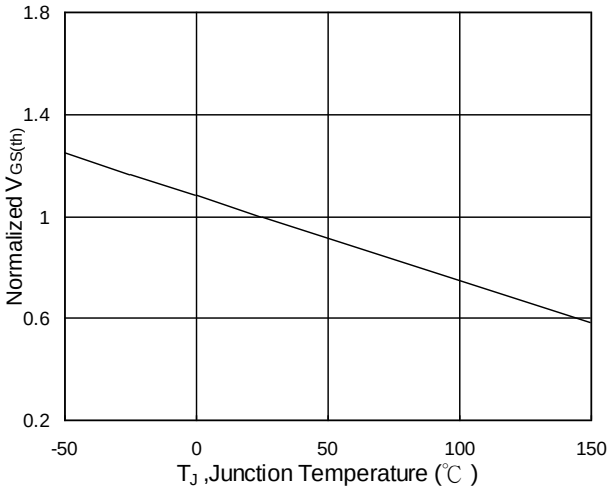


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

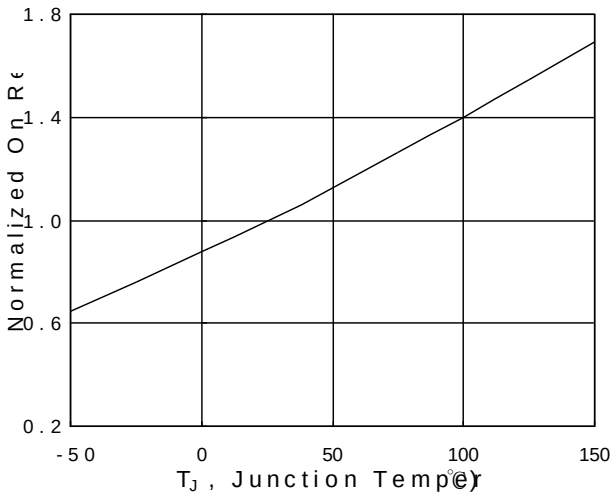


Fig.6 Normalized R_{DSON} vs. T_J

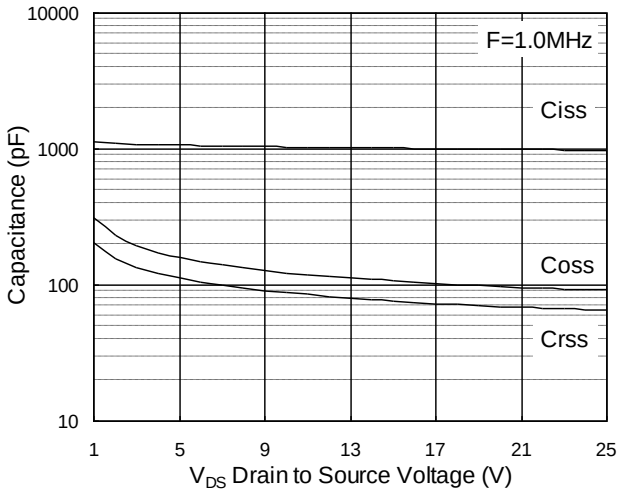


Fig.7 Capacitance

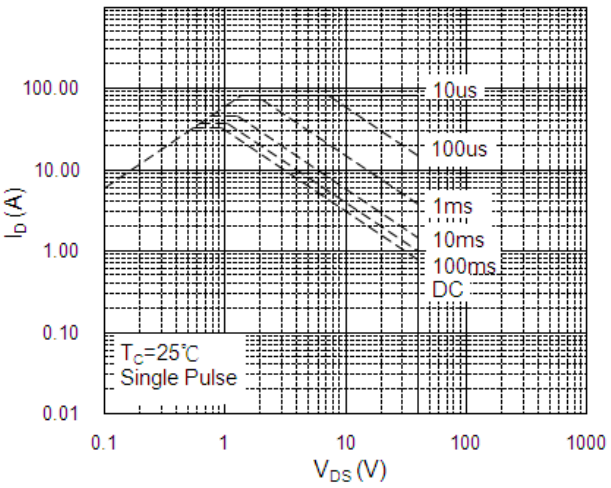


Fig.8 Safe Operating Area

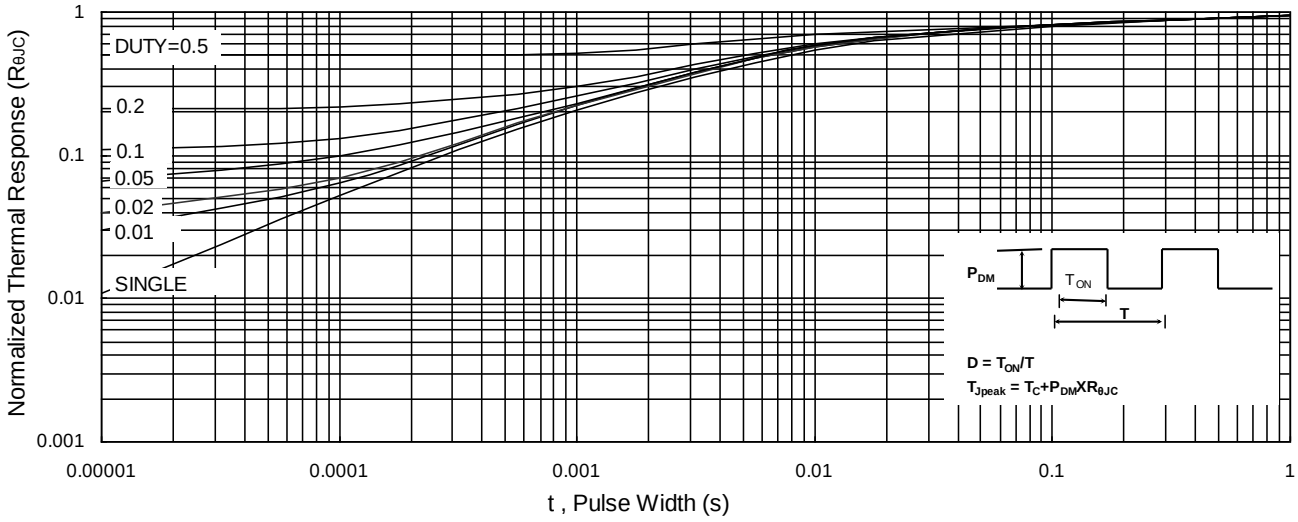


Fig.9 Normalized Maximum Transient Thermal Impedance

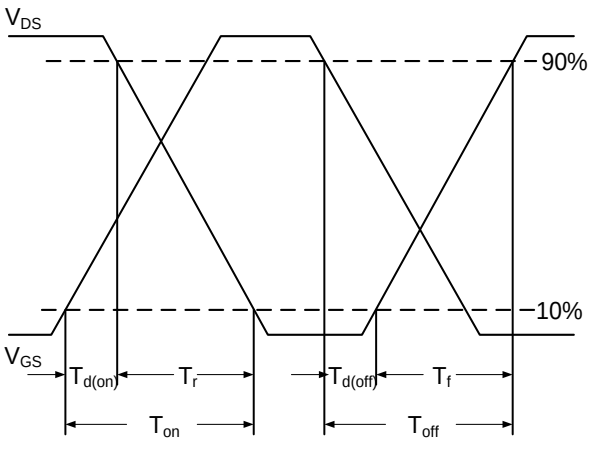


Fig.10 Switching Time Waveform

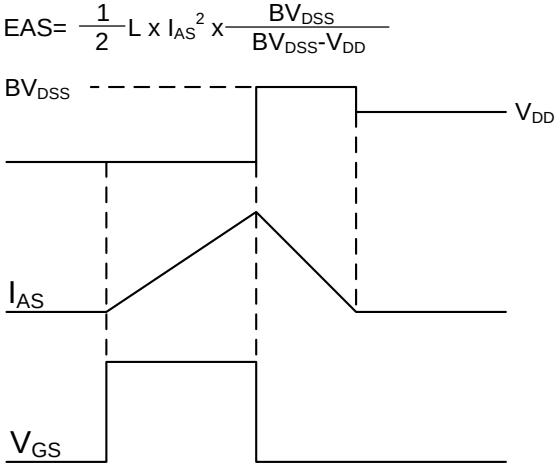


Fig.11 Unclamped Inductive Switching Waveform

P-Channel Typical Characteristics

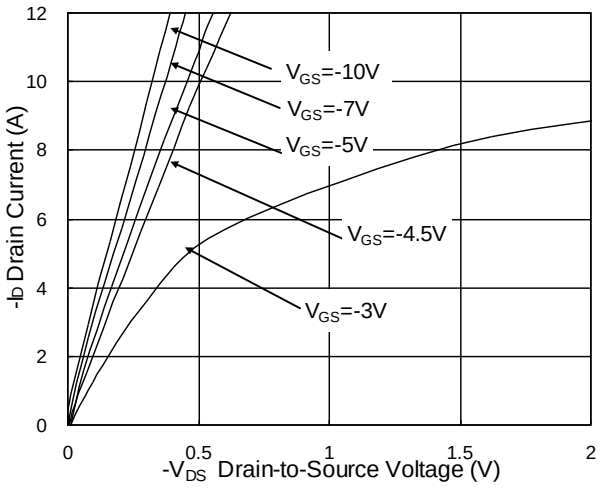


Fig.1 Typical Output Characteristics

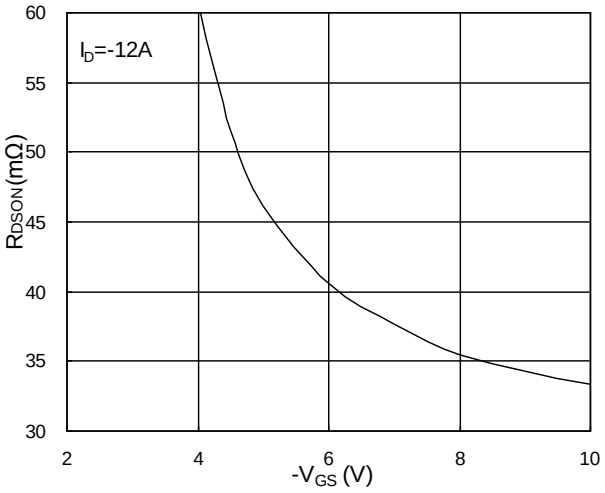


Fig.2 On-Resistance v.s Gate-Source

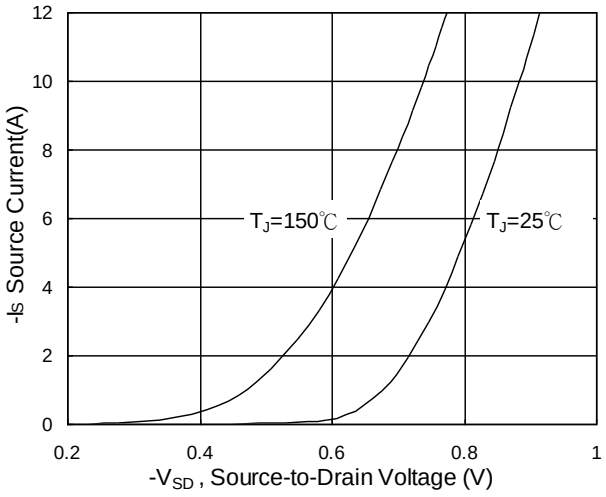


Fig.3 Forward Characteristics of Reverse

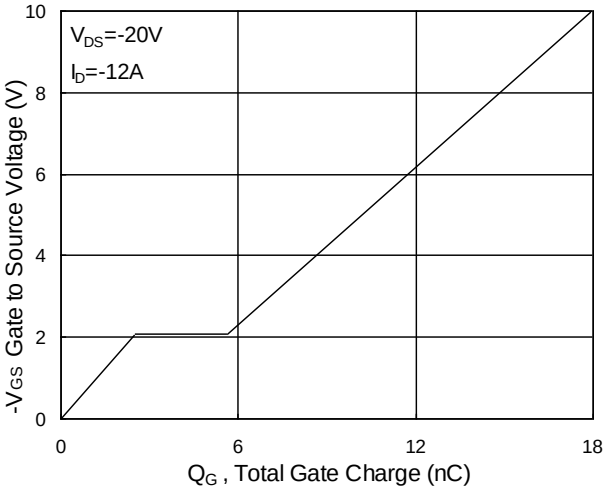


Fig.4 Gate-Charge Characteristics

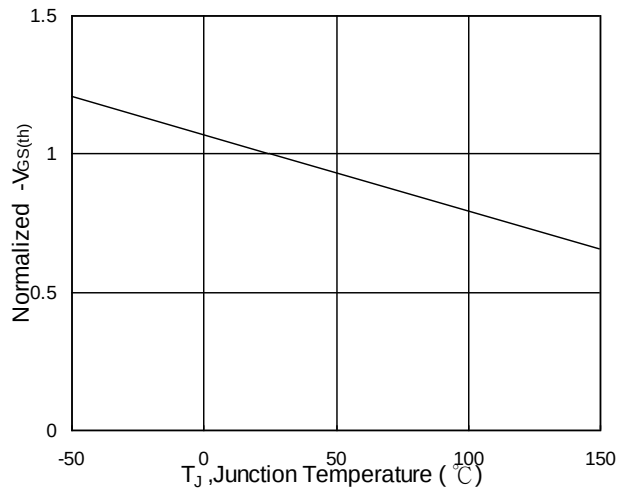


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

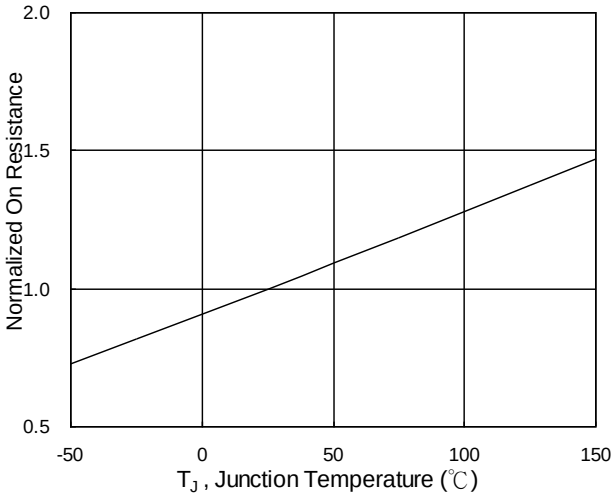


Fig.6 Normalized R_{DSON} v.s T_J

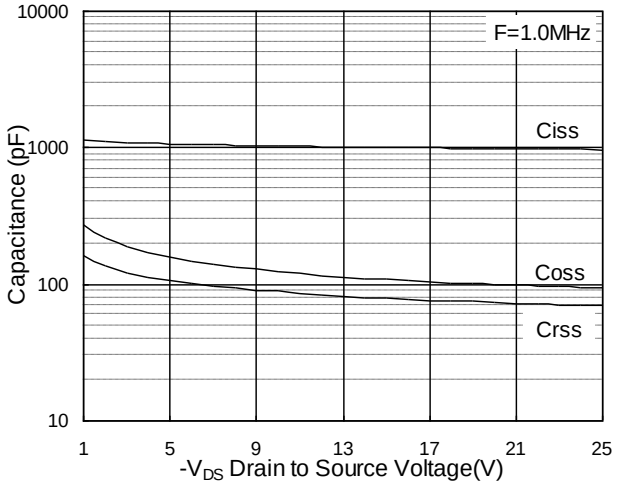


Fig.7 Capacitance

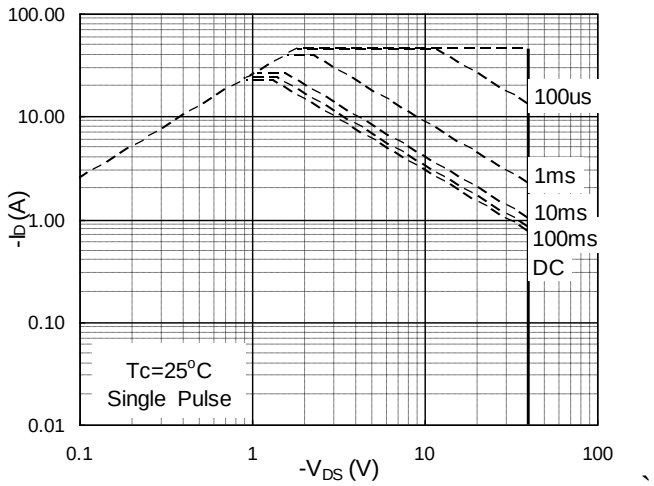


Fig.8 Safe Operating Area

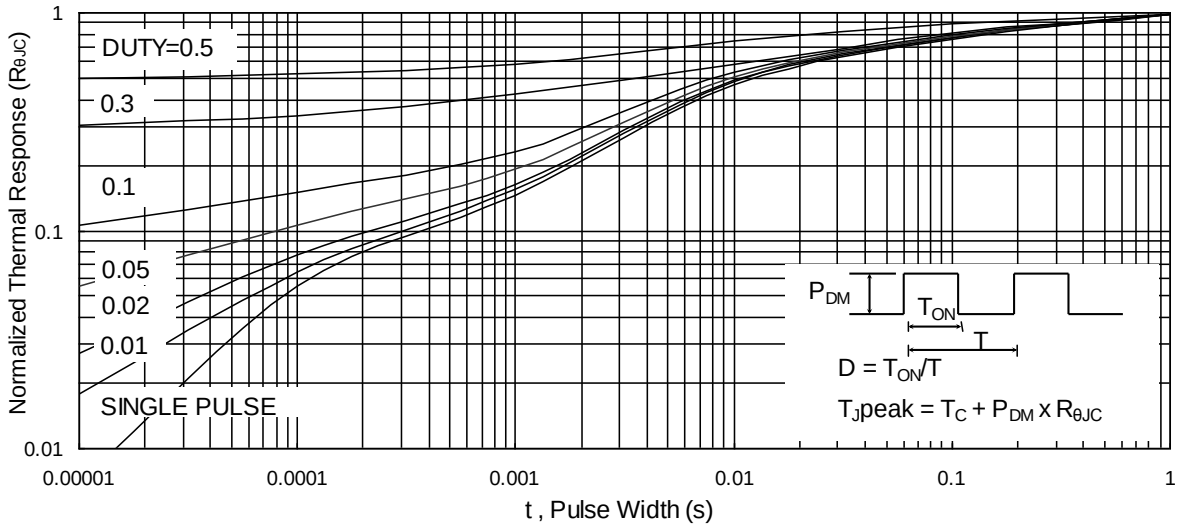


Fig.9 Normalized Maximum Transient Thermal Impedance

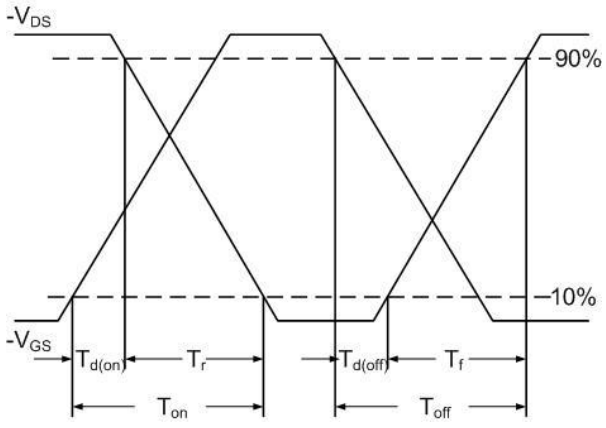


Fig.10 Switching Time Waveform

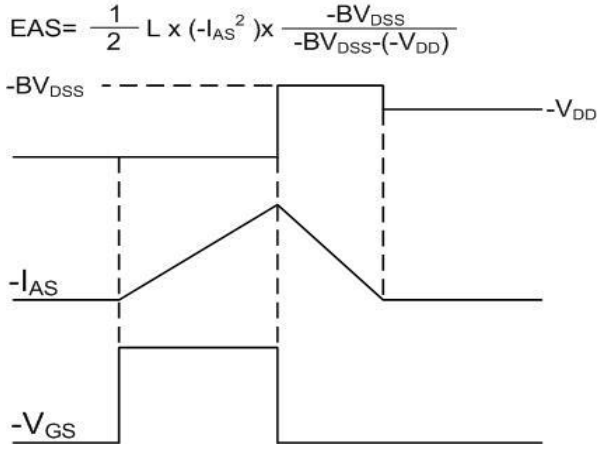
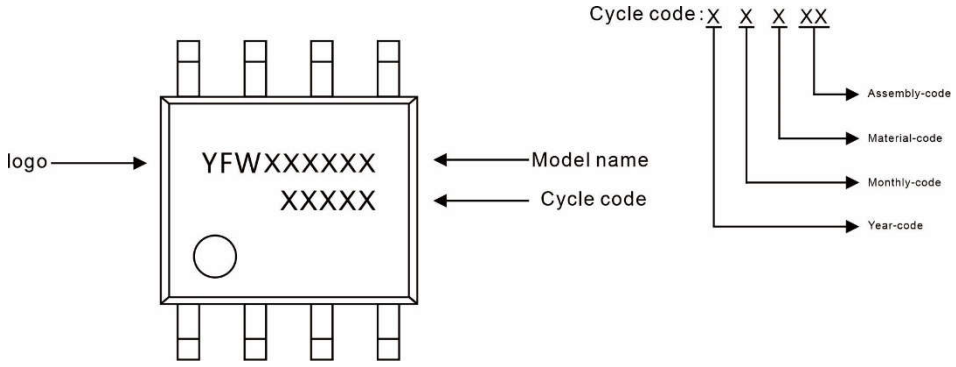


Fig.11 Unclamped Inductive Waveform

Marking Diagram

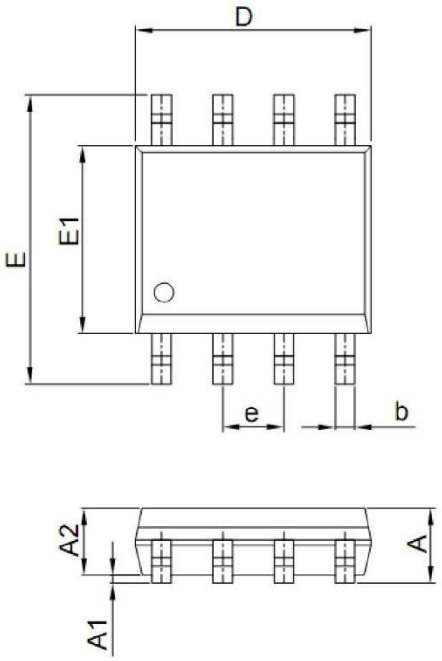


Ordering information

Package	Packing Description	Packing Quantity
SOP-8	Tape/Reel,13"reel	3000PCS/Reel 30000PCS/Carton

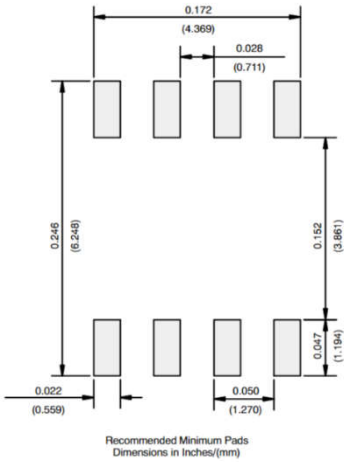
Package Dimensions

SOP-8



Dim	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
A2	1.35	1.50	0.053	0.059
b	0.35	0.55	0.014	0.022
c	0.15	0.25	0.006	0.010
D	4.80	5.00	0.189	0.197
D1	3.10	3.50	0.122	0.138
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
E2	2.20	2.60	0.087	0.102
e	1.27 (BSC)		0.050 (BSC)	
L	0.40	1.27	0.016	0.050
θ	0°	8°	0°	8°

The recommended mounting pad size



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