



YEA SHIN TECHNOLOGY CO., LTD

YS2309LCF

P-Channel Enhancement MOSFET

VDS= -20V, ID= -8.5A



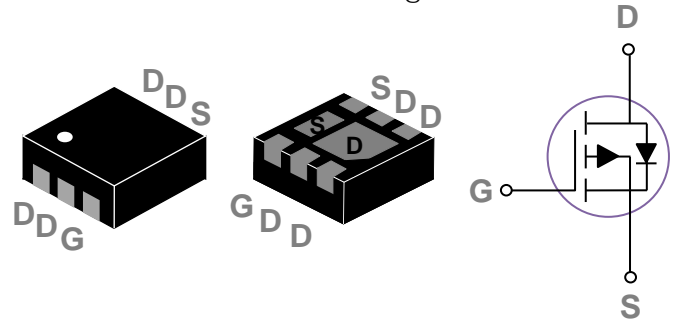
Features

- -20V, -8.5A, $R_{DS(ON)} = 28m\Omega @ V_{GS} = -4.5V$
- Improved dv/dt capability
- Fast switching
- Green Device Available
- Suit for -1.8V Gate Drive Applications

Applications

- Notebook
- Load Switch
- Battery Protection
- Hand-held Instruments

DFN2x2-6L 2EP Pin Configuration



Absolute Maximum Ratings $T_c=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 10	V
I_D	Drain Current – Continuous ($T_c=25^\circ\text{C}$)	-8.5	A
	Drain Current – Continuous ($T_c=100^\circ\text{C}$)	-5.4	A
I_{DM}	Drain Current – Pulsed ¹	-34	A
P_D	Power Dissipation ($T_c=25^\circ\text{C}$)	3.3	W
	Power Dissipation – Derate above 25°C	0.026	W/ $^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	38	$^\circ\text{C}/\text{W}$

DEVICE CHARACTERISTICS

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Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-20	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=-1mA$	---	-0.02	---	$V/^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-20V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	-1	μA
		$V_{DS}=-16V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	-10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 10V, V_{DS}=0V$	---	---	± 100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-source On-Resistance	$V_{GS}=-4.5V, I_D=-4A$	---	22	28	$m\Omega$
		$V_{GS}=-2.5V, I_D=-3A$	---	27	37	$m\Omega$
		$V_{GS}=-1.8V, I_D=-2A$	---	33	45	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-0.3	-0.6	-1	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	2	---	$mV/^\circ\text{C}$
g_{fs}	Forward Transconductance	$V_{DS}=-10V, I_D=-3A$	---	8.4	---	S

Dynamic and Switching Characteristics

Q_g	Total Gate Charge ^{2,3}	$V_{DS}=-10V, V_{GS}=-4.5V, I_D=-4A$	---	16.1	25	nC
Q_{gs}	Gate-Source Charge ^{2,3}		---	1.8	3	
Q_{gd}	Gate-Drain Charge ^{2,3}		---	3.8	7	
$T_{d(on)}$	Turn-On Delay Time ^{2,3}	$V_{DD}=-10V, V_{GS}=-4.5V, R_G=25\Omega, I_D=-1A$	---	8.2	16	ns
T_r	Rise Time ^{2,3}		---	30	57	
$T_{d(off)}$	Turn-Off Delay Time ^{2,3}		---	71.1	135	
T_f	Fall Time ^{2,3}		---	19.8	38	
C_{iss}	Input Capacitance	$V_{DS}=-15V, V_{GS}=0V, f=1MHz$	---	1440	2100	pF
C_{oss}	Output Capacitance		---	155	230	
C_{rss}	Reverse Transfer Capacitance		---	115	170	

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	-8.5	A
I_{SM}	Pulsed Source Current		---	---	-17	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$	---	---	-1	V

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. Essentially independent of operating temperature.

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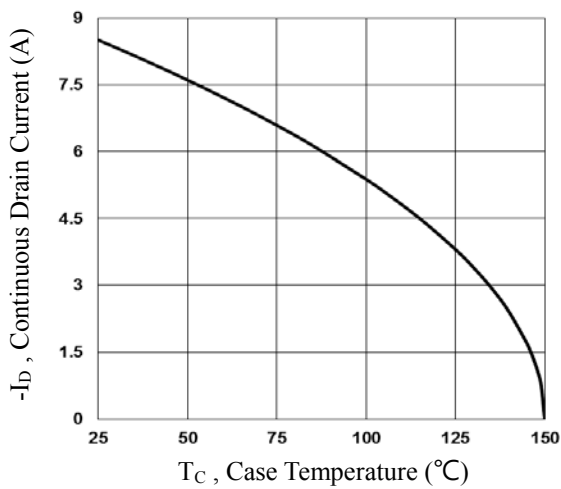


Fig.1 Continuous Drain Current vs. T_c

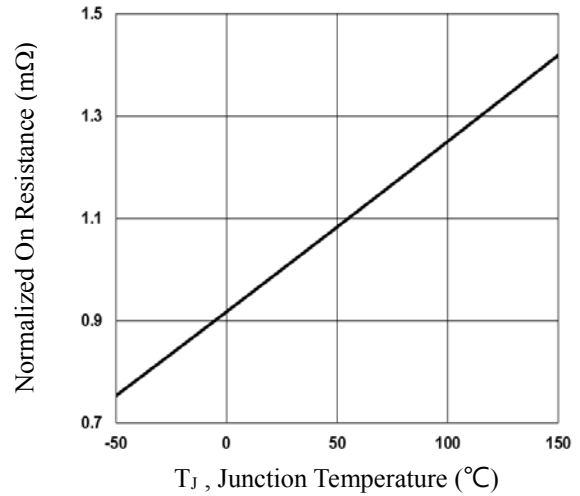


Fig.2 Normalized $R_{DS(on)}$ vs. T_j

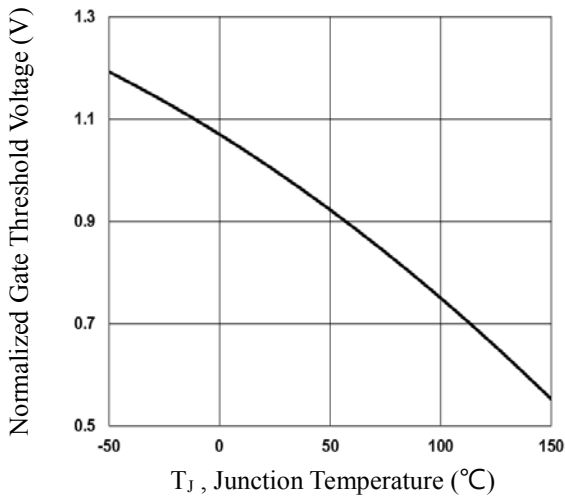


Fig.3 Normalized V_{th} vs. T_j

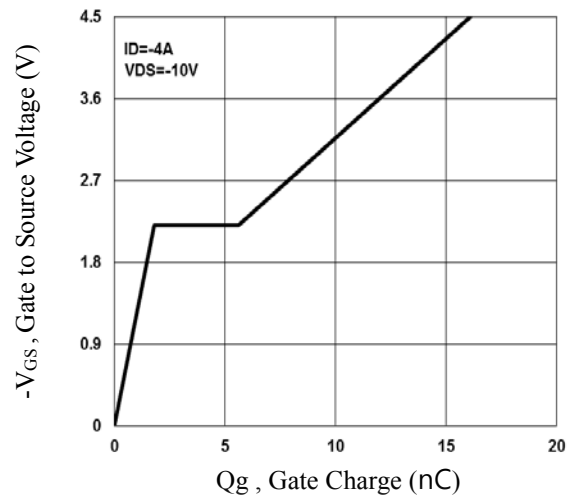


Fig.4 Gate Charge Waveform

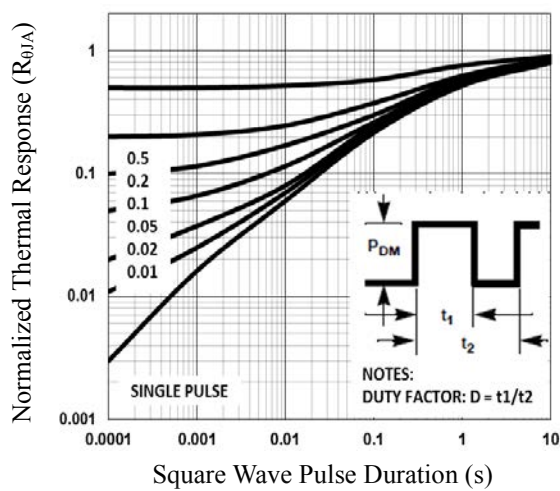


Fig.5 Normalized Transient Impedance

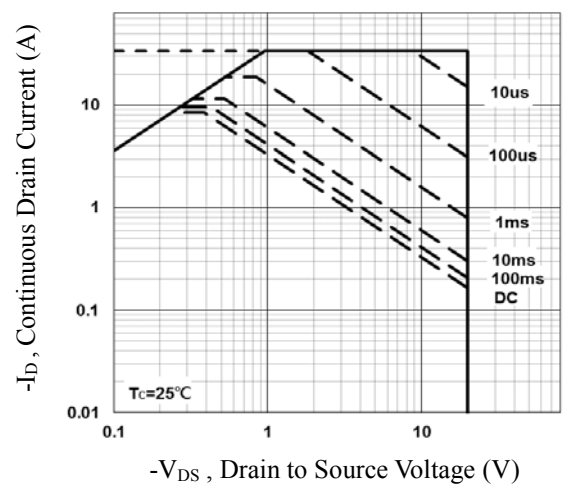


Fig.6 Maximum Safe Operation Area

DEVICE CHARACTERISTICS

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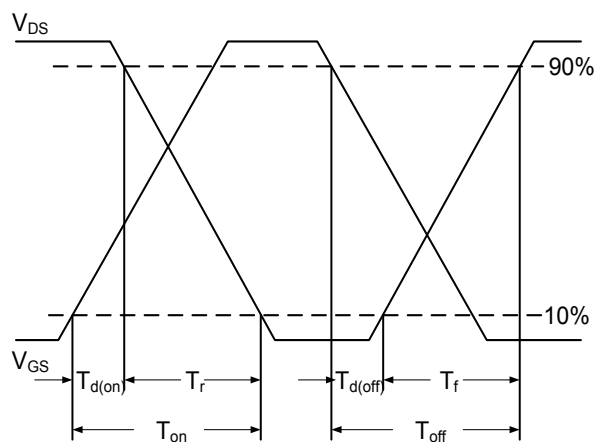


Fig.7 Switching Time Waveform

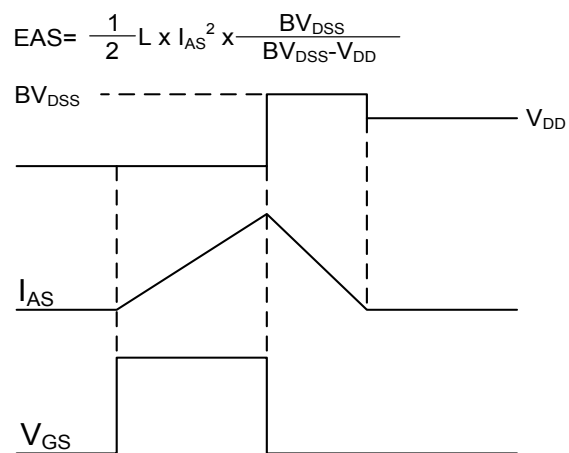
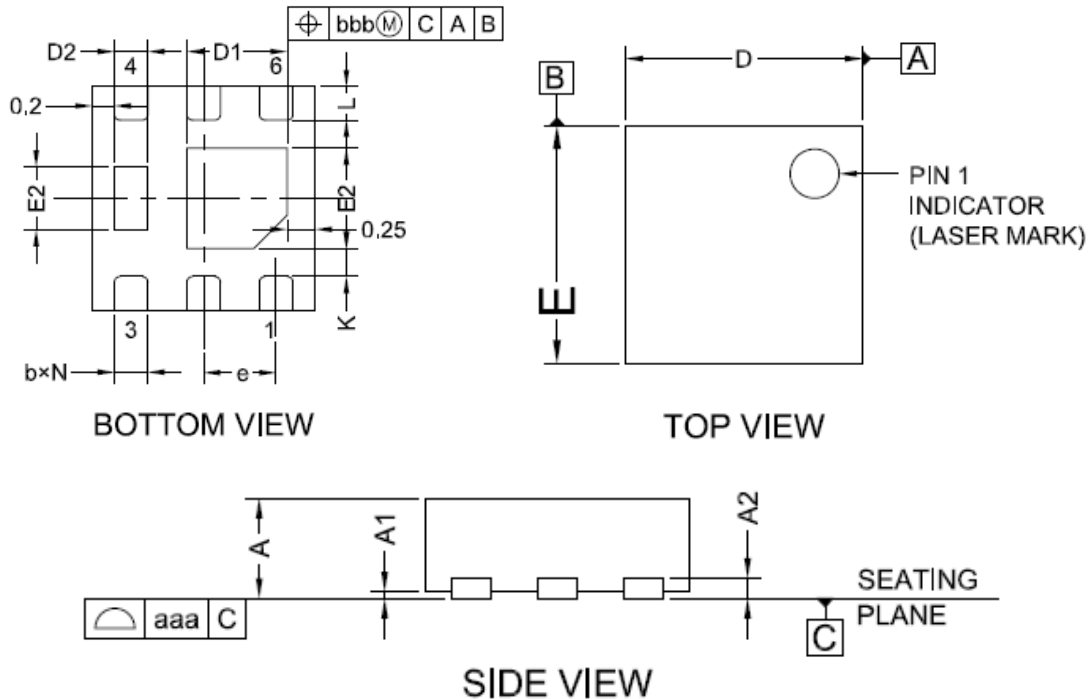


Fig.8 EAS Waveform

PACKAGE OUTLINE & DIMENSIONS

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DFN2x2-6L 2EP PACKAGE INFORMATION



COMMON DIMENSIONS

(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	TYP	MAX
A	0.50	0.55	0.60
A1	0.00	0.02	0.05
A2	0.152REF.		
b	0.25	0.30	0.35
D	1.95	2.00	2.05
D1	0.80	0.90	1.00
D2	0.25	0.30	0.35
E	1.95	2.00	2.05
E1	0.80	0.90	1.00
E2	0.46	0.56	0.66
e	0.65BSC		
L	0.25	0.30	0.35
J	0.40BSC		
K	0.20MIN		
N	6		
aaa	0.08		
bbb	0.10		