PAN2012EB

N-Ch 20V Fast Switching MOSFET

V_{DS}=20V, I_D=0.7A, $R_{DS(ON)}$=450mΩ

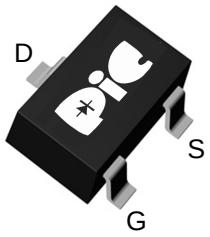
➢ General Description

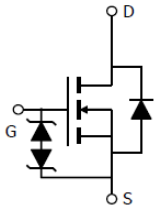
This PAN2012EB N-Channel enhancement mode power field effect transistor is the high density trench technology and this advanced technology can provide excellent Rds(On) performance and efficiency for power switching and load switching application., this device also comply with the RoHS and Green Product requirement with full function reliability approved.

➢ Feature

- ●Low Offset (Error) Voltage
- ●Low-Voltage Operation
- ●High-Speed Circuits
- ●ESD Protected
- ●Low Battery Voltage Operation
- ●SOT-523 package design

➢ SOT-523





➢ Application

- ●Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories
- ●Battery Operated Systems
- ●Power Supply Converter Circuits
- ●Load/Power Switching Smart Phones

➢ Absolute Maximum Ratings

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±8	V
Continuous Drain Current, V_{GS} @ 4.5V[1]	I_D@T_A=25℃	0.7	A
Continuous Drain Current, V_{GS} @ 4.5V[1]	I_D@T_A=70℃	0.6	A
Pulsed Drain Current[2]	I_{DM}	2.1	A
Total Power Dissipation[3]	P_D@T_A=25℃	0.4	W
Storage Temperature Range	T_{STG}	-55 to 150	℃
Operating Junction Temperature Range	T_J	-55 to 150	℃
Thermal Resistance Junction-Ambient [1]	$R_{\theta JA}$	280	℃/W

➢ Electrical Characteristics (T_J=25°C Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V , I_D=250uA	20	---	---	V
Static Drain-Source On-Resistance[2]	$R_{DS(ON)}$	V_{GS}=4V , I_D=600mA	---	230	450	mΩ
		V_{GS}=2.5V , I_D=400mA	---	300	760	mΩ
		V_{GS}=1.8V , I_D=200mA	---	400	850	mΩ
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS} , I_D =250uA	0.3	---	1	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=16V , V_{GS}=0V , T_J=25℃	---	---	1	uA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±8V , V_{DS}=0V	---	---	±30	uA
Total Gate Charge (4.5V)	Q_g	V_{DS}=16V , V_{GS}=4.5V , I_D=1A	---	1.2	---	nC
Gate-Source Charge	Q_{gs}		---	0.24	---	
Gate-Drain Charge	Q_{gd}		---	0.3	---	
Turn-On Delay Time	$T_{d(on)}$	V_{DD}=10V , V_{GS}=4.5V , R_G=3.3Ω, I_D=0.5A	---	1.1	---	ns
Rise Time	T_r		---	20	---	
Turn-Off Delay Time	$T_{d(off)}$		---	5	---	
Fall Time	T_f		---	48	---	
Input Capacitance	C_{iss}	V_{DS}=15V , V_{GS}=0V , F=1MHz	---	47	---	pF
Output Capacitance	C_{oss}		---	16	---	
Reverse Transfer Capacitance	C_{rss}		---	11	---	

➢ Diode Characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Continuous Source Current[1,6]	I_S	V_G=V_D=0V , Force Current	---	---	0.56	A
Diode Forward Voltage[2]	V_{SD}	V_{GS}=0V , I_S=0.5A , T_J=25℃	---	---	1.0	V

Note :

1.Pulse width limited by maximum junction temperature.

2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

3.Ensure that the channel temperature does not exceed 150°C.

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

➢ Typical Characteristics

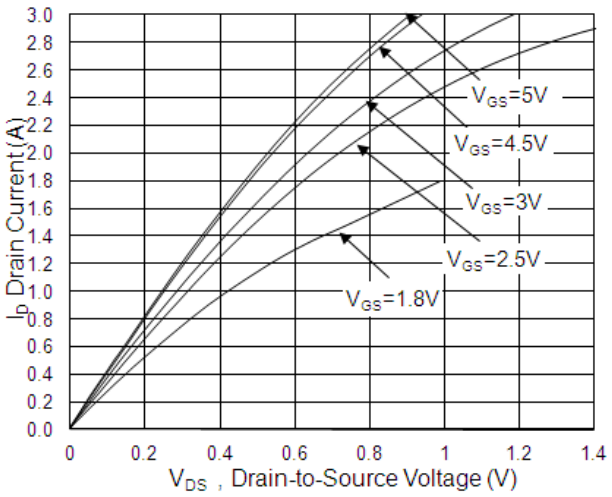


Fig.1 Typical Output Characteristics

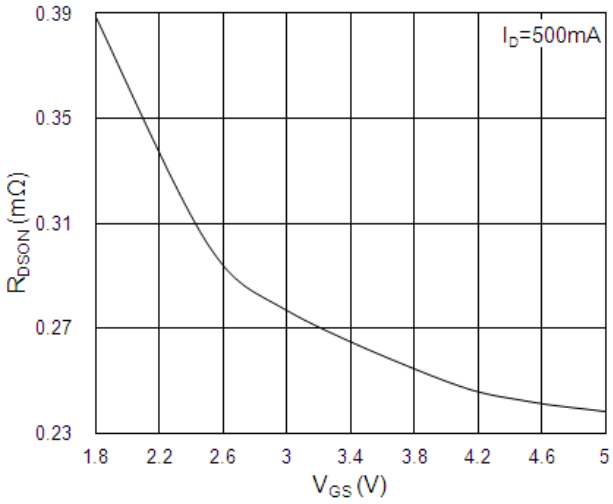


Fig.2 On-Resistance vs. Gate-Source

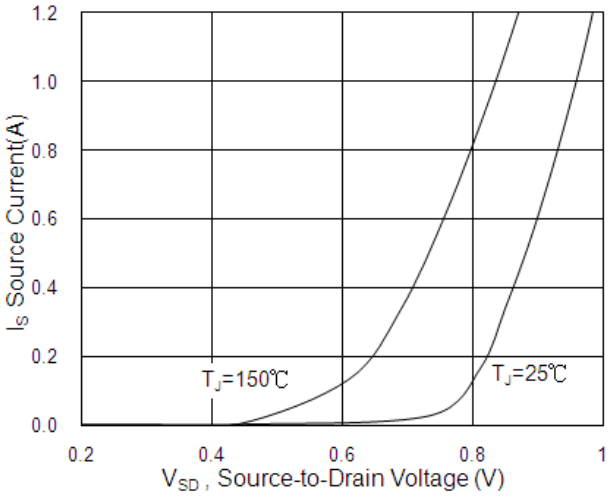


Fig.3 Forward Characteristics of Reverse

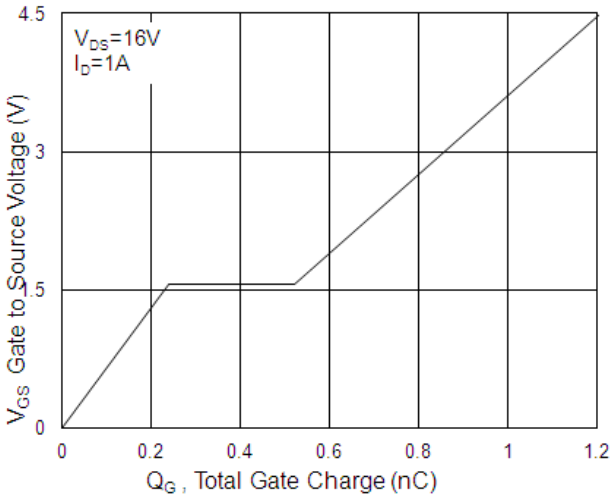


Fig.4 Gate-Charge Characteristics

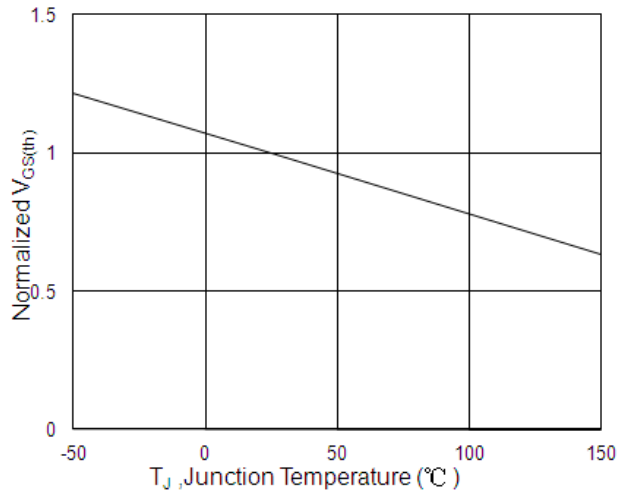


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

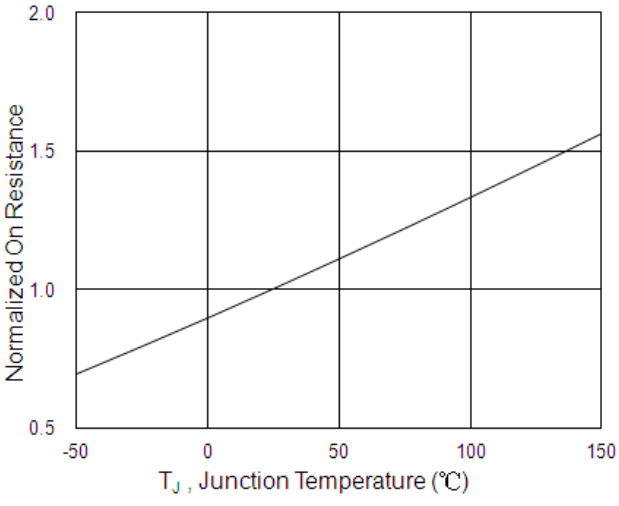


Fig.6 Normalized R_{DSON} vs. T_J

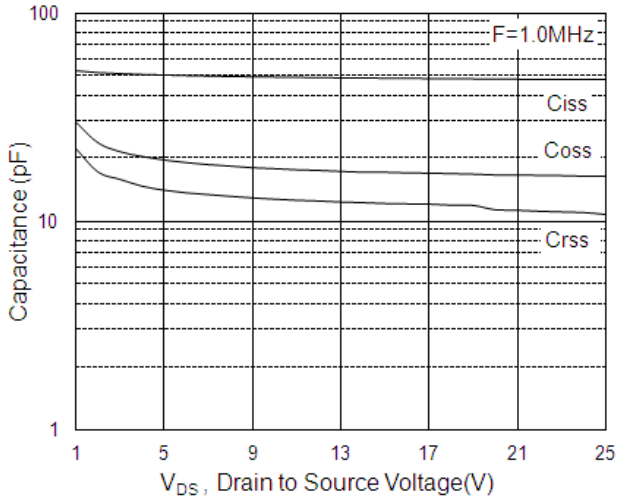


Fig.7 Capacitance

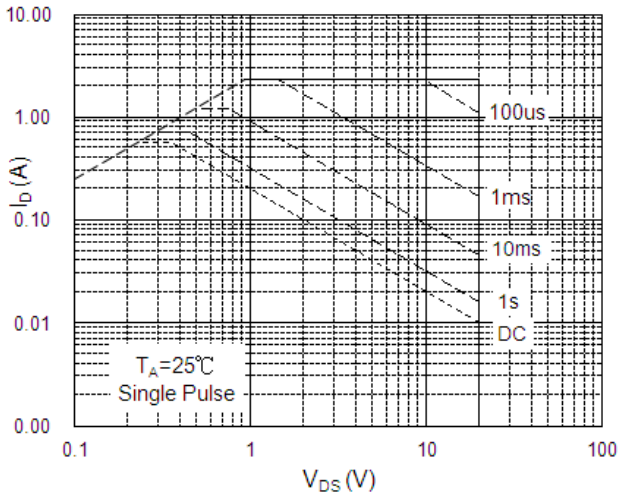


Fig.8 Safe Operating Area

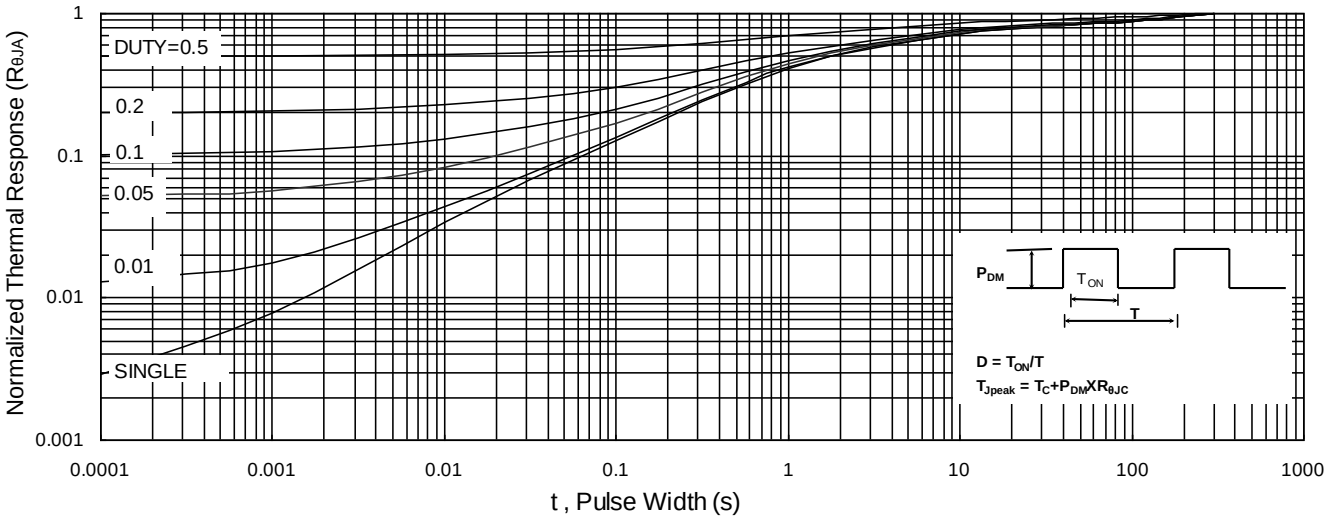


Fig.9 Normalized Maximum Transient Thermal Impedance

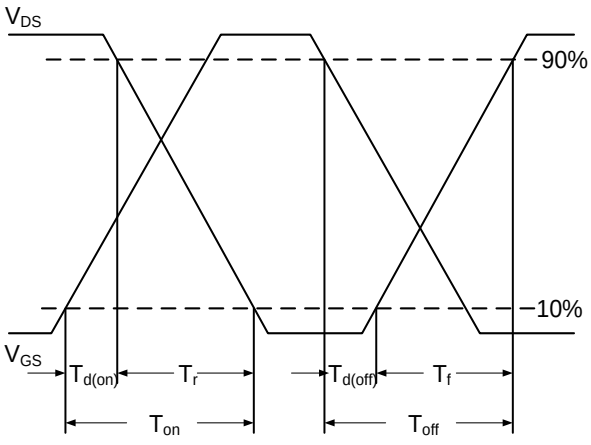


Fig.10 Switching Time Waveform

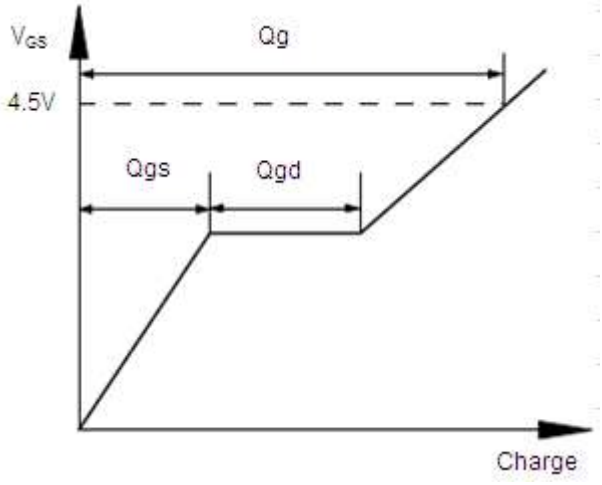
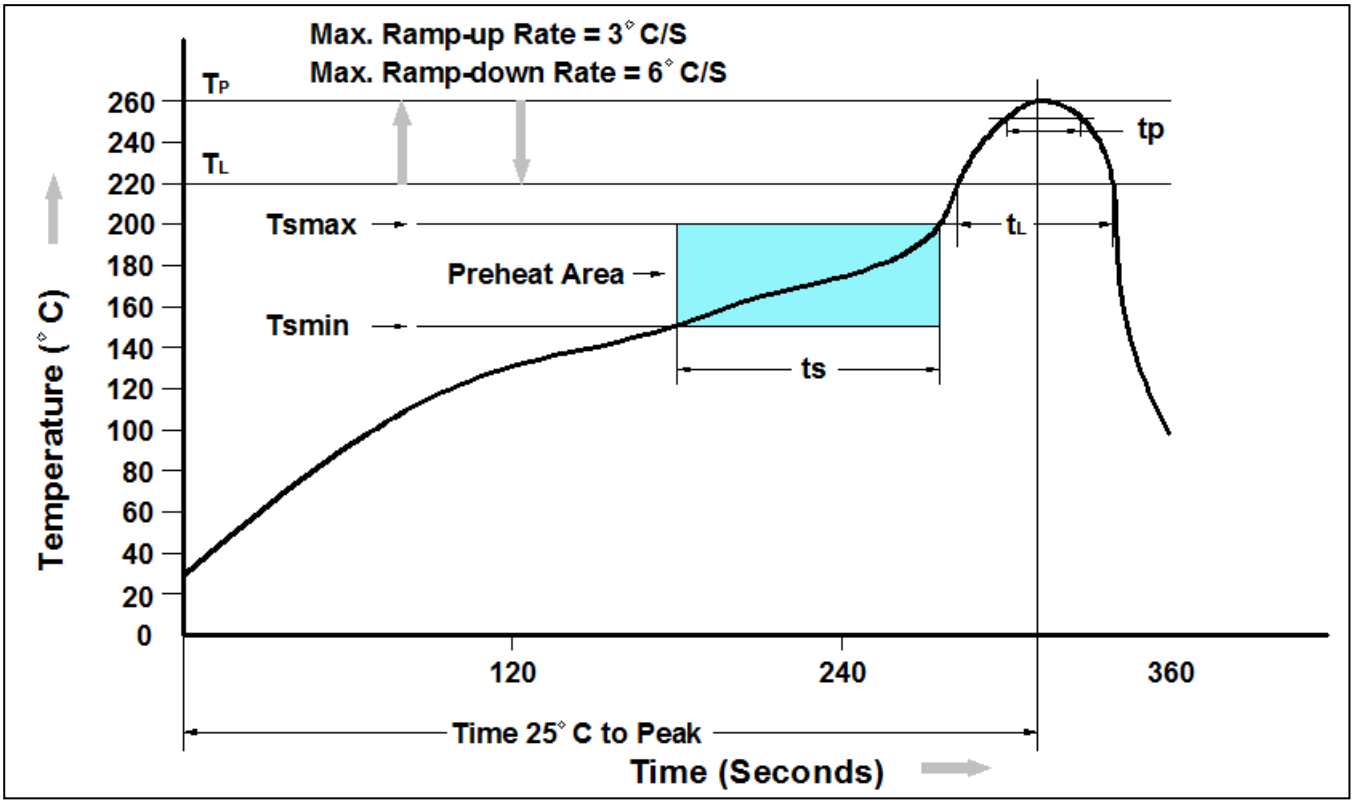


Fig.11 Gate Charge Waveform

➢ Recommand IR Reflow Soldering Thermal Profile

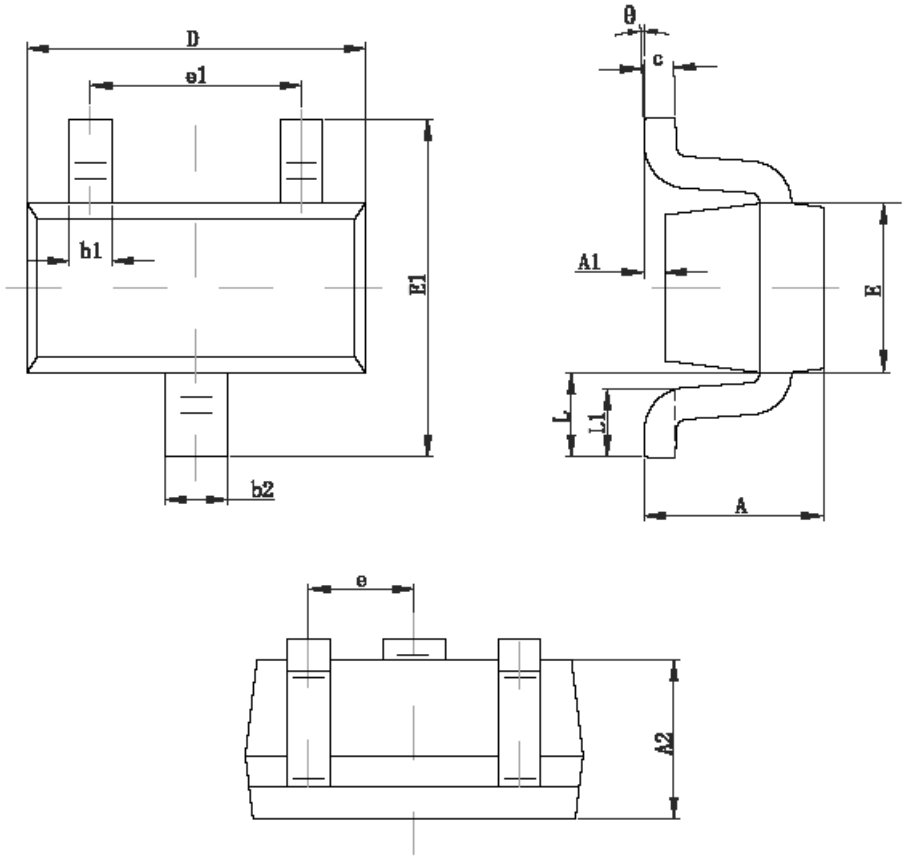


Profile Feature	Pb-Free Assembly Profile
Temperature Min. (Tsmin)	150°C
Temperature Max. (Tsmax)	200°C
Time (ts) from (Tsmin to Tsmax)	60-120 seconds
Average Ramp-up Rate (tL to tP)	3°C/second max.
Liquidous Temperature (TL)	217°C
Time (tL) Maintained Above (TL)	60 – 150 seconds
Peak Temperature	260°C +0°C / -5°C
Time (tP) within 5°C of actual Peak Temperature	30 seconds
Ramp-down Rate (TP to TL)	6°C/second max
Time 25°C to Peak Temperature	8 minutes max.

➢ Ordering Information

Part Number	Description	Quantity
PAN2012EB	SOT-523 Reel	3000 pcs

➢ Package Information (SOT-523)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.700	0.900	0.028	0.035
A1	0.000	0.100	0.000	0.004
A2	0.700	0.800	0.028	0.031
b1	0.150	0.250	0.006	0.010
b2	0.250	0.325	0.010	0.013
c	0.100	0.200	0.004	0.008
D	1.500	1.700	0.059	0.067
E	0.750	0.850	0.030	0.033
E1	1.450	1.750	0.057	0.069
e	0.500 TYP		0.020 TYP	
e1	0.900	1.100	0.035	0.043
L	0.550 REF		0.022 REF	
L1	0.280	0.440	0.011	0.017
θ	0°	4°	0°	4°

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