

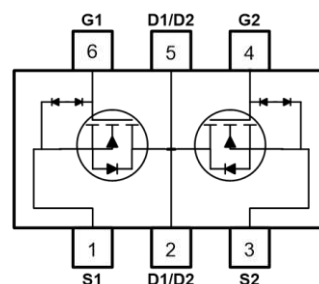
➤ General Description

This PAN20E60C Dual N-Channel enhancement mode power field effect transistor is the high density trench technology and this advanced technology can provide excellent $R_{ds(On)}$ 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

- Super Low Gate Charge
- Green Device Available
- Excellent CdV/dt effect decline
- ESD Protected
- Advanced high cell density Trench technology
- TSOP-6 package design

➤ TSOP-6



➤ Absolute Maximum Ratings

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current ¹	$I_D@T_A=25^\circ C$	6	A
Continuous Drain Current ¹	$I_D@T_A=70^\circ C$	4.8	A
Pulsed Drain Current ²	I_{DM}	25	A
Total Power Dissipation ³	$P_D@T_A=25^\circ C$	1.25	W
Storage Temperature Range	T_{STG}	-55 to 150	$^\circ C$
Operating Junction Temperature Range	T_J	-55 to 150	$^\circ C$
Thermal Resistance Junction-ambient ¹	$R_{\theta JA}$	100	$^\circ C/W$

➤ Electrical Characteristics ($T_J=25^\circ C$ Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V$, $I_D=250\mu A$	20	---	---	V
Static Drain-Source On-Resistance ²	$R_{DS(ON)}$	$V_{GS}=4.5V$, $I_D=3A$	15	16.5	20	$m\Omega$
		$V_{GS}=4.0V$, $I_D=3A$	15.5	17	20.5	
		$V_{GS}=3.7V$, $I_D=3A$	16	17.5	21	
		$V_{GS}=3.1V$, $I_D=3A$	17	18.5	23	
		$V_{GS}=2.5V$, $I_D=3A$	18.5	21	26	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}$, $I_D=250\mu A$	0.5	0.7	1.2	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=16V$, $V_{GS}=0V$, $T_J=25^\circ C$	---	---	1	μA
		$V_{DS}=16V$, $V_{GS}=0V$, $T_J=55^\circ C$	---	---	5	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 8V$, $V_{DS}=0V$	---	---	± 10	μA
Forward Transconductance	g_{fs}	$V_{DS}=5V$, $I_D=3A$	---	17	---	S
Total Gate Charge	Q_g	$V_{DS}=15V$, $V_{GS}=4.5V$, $I_D=6A$	---	10.4	---	nC
Gate-Source Charge	Q_{gs}		---	1.3	---	
Gate-Drain Charge	Q_{gd}		---	2.6	---	
Turn-On Delay Time	$T_{d(on)}$	$V_{DD}=10V$, $V_{GS}=4.5V$, $R_G=3.3\Omega$ $I_D=3A$	---	3.2	---	ns
Rise Time	T_r		---	9.8	---	
Turn-Off Delay Time	$T_{d(off)}$		---	31	---	
Fall Time	T_f		---	3.6	---	
Input Capacitance	C_{iss}	$V_{DS}=15V$, $V_{GS}=0V$, $f=1MHz$	---	630	---	pF
Output Capacitance	C_{oss}		---	66	---	
Reverse Transfer Capacitance	C_{rss}		---	63	---	

➤ Diode Characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Continuous Source Current ^{1,4}	I_S	$V_G=V_D=0V$, Force Current	---	---	5.5	A
Diode Forward Voltage ²	V_{SD}	$V_{GS}=0V$, $I_S=1A$, $T_J=25^\circ C$	---	0.78	1.2	V

Note :

1. Pulse width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
3. Ensure that the channel temperature does not exceed $150^\circ C$.
4. The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

➤ Typical Characteristics

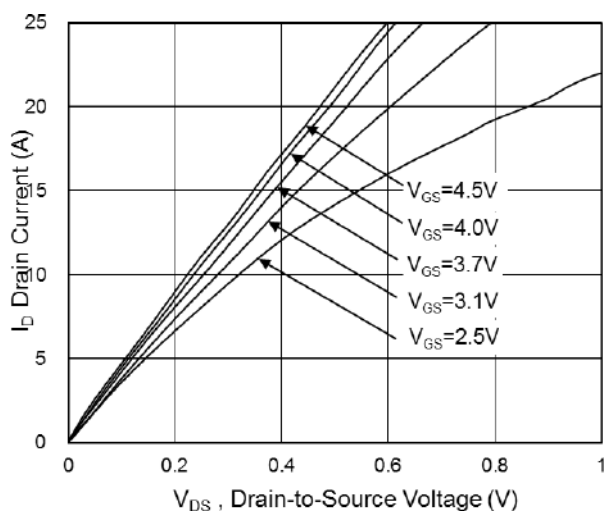


Fig.1 Typical Output Characteristics

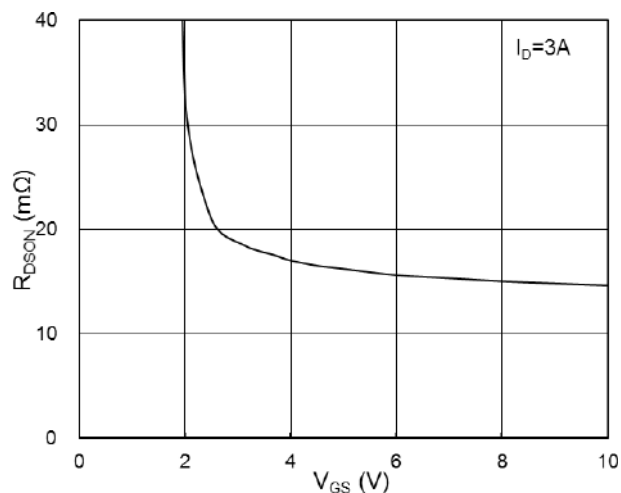


Fig.2 On-Resistance vs. Gate-Source voltage

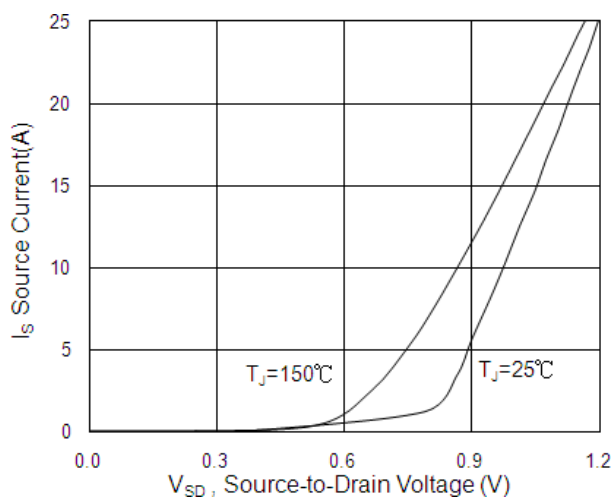


Fig.3 Forward Characteristics of Reverse

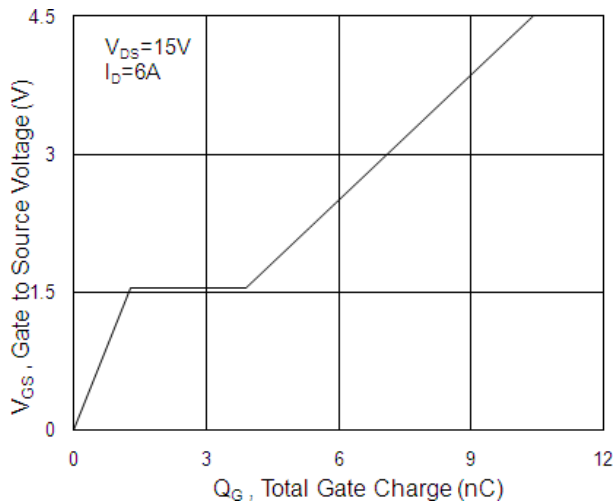


Fig.4 Gate-Charge Characteristics

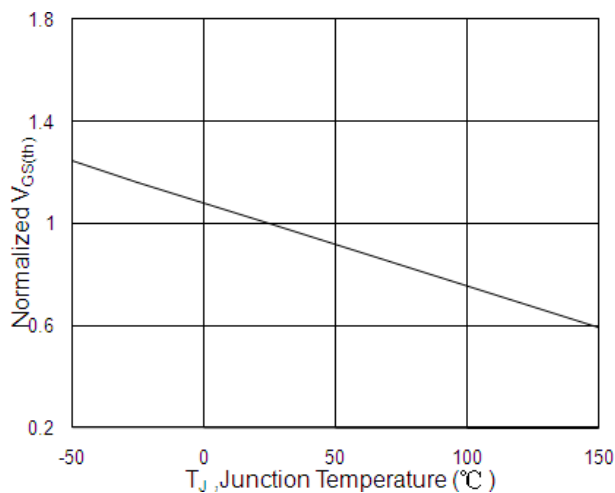


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

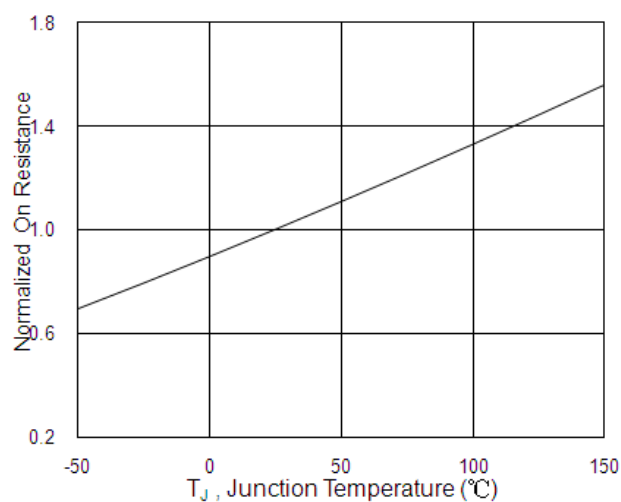


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

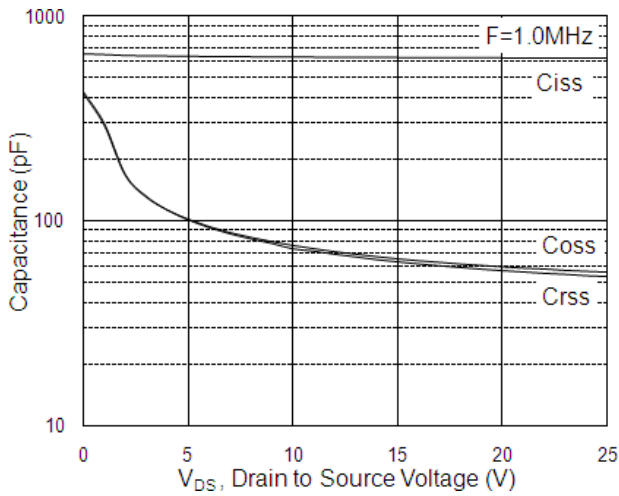


Fig.7 Capacitance

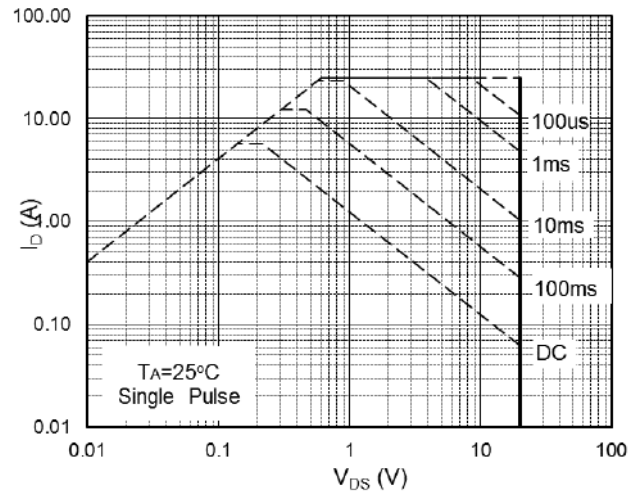


Fig.8 Safe Operating Area

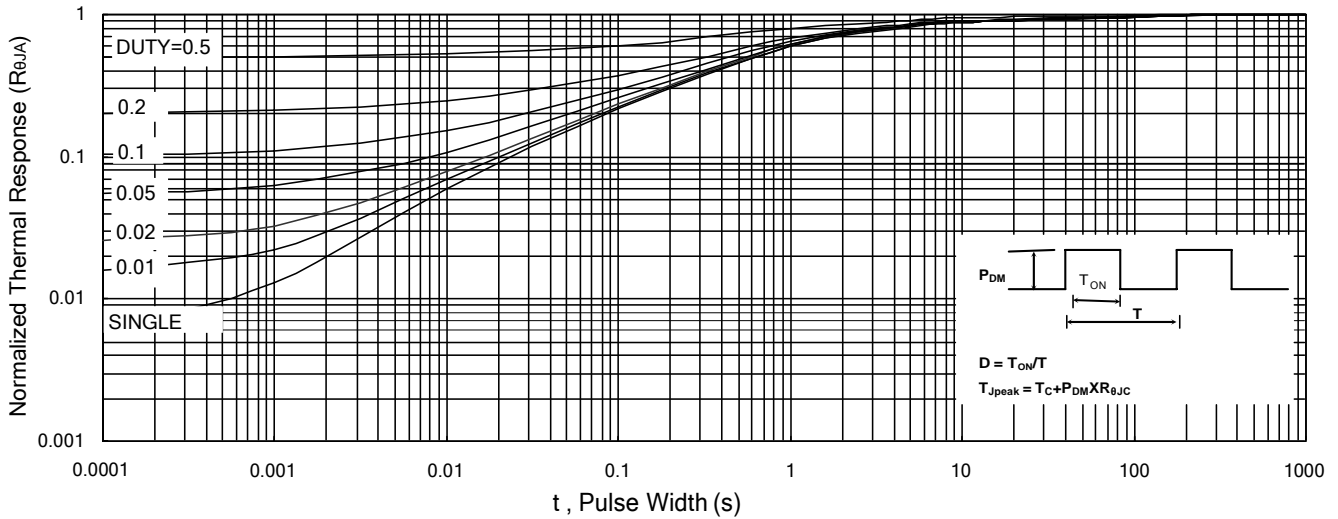


Fig.9 Normalized Maximum Transient Thermal Impedance

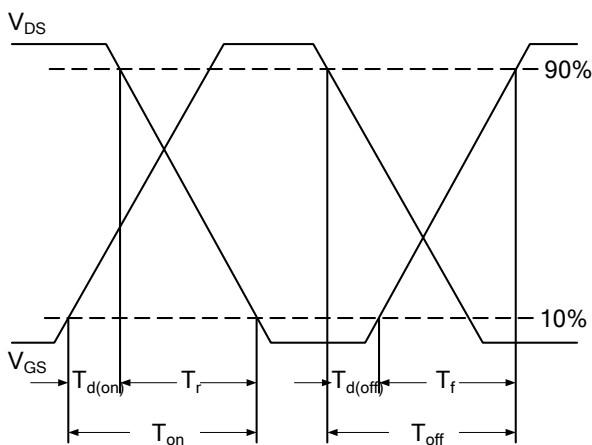


Fig.10 Switching Time Waveform

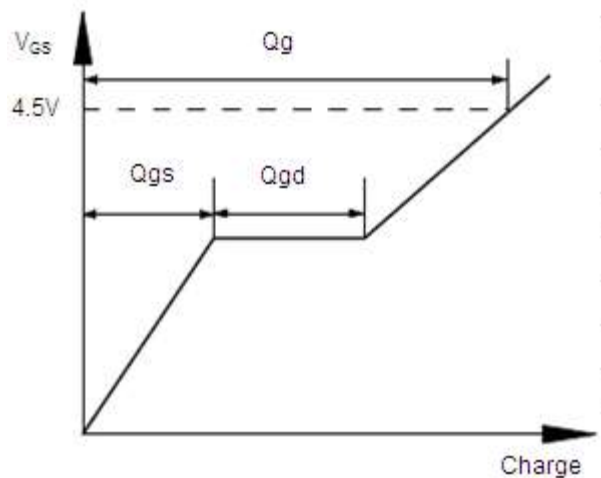
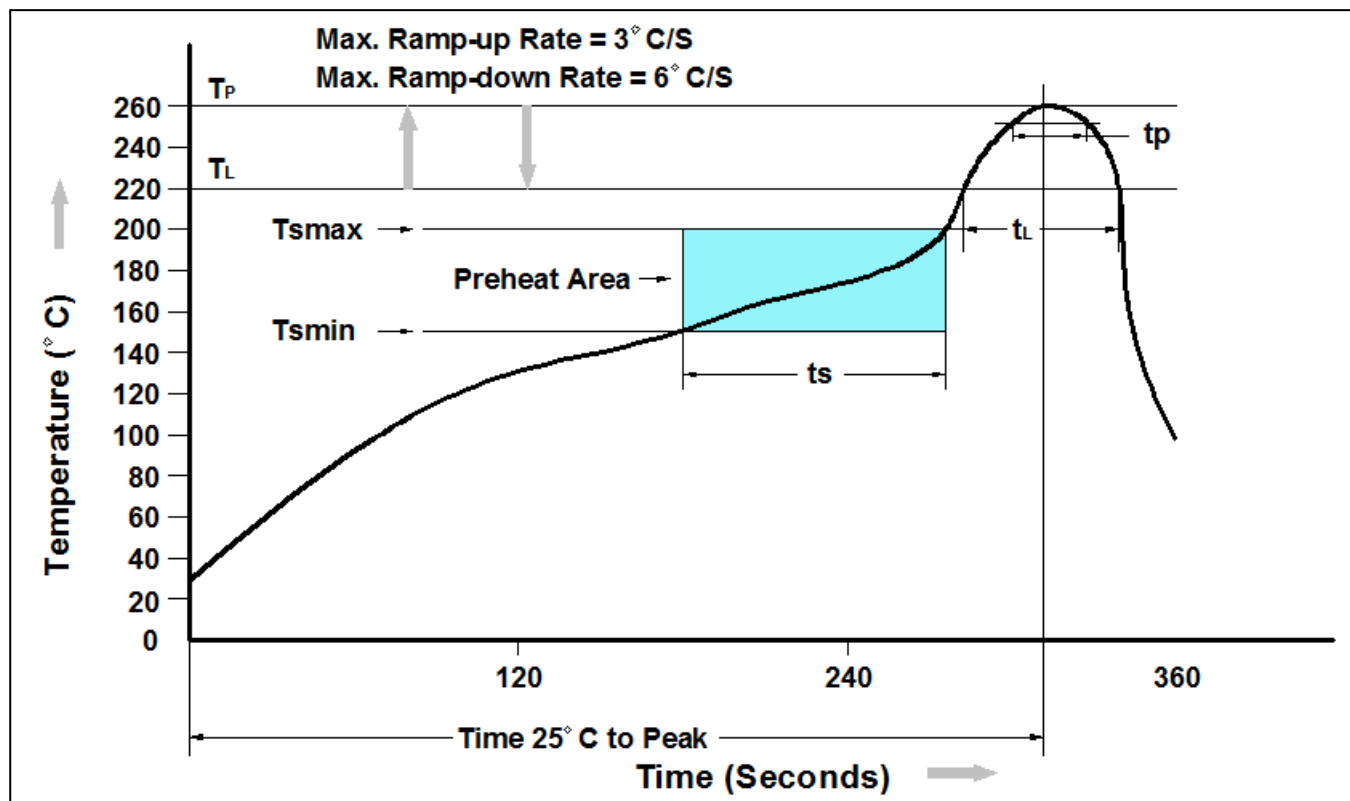


Fig.11 Gate Charge Waveform

➤ Recommend IR Reflow Soldering Thermal Profile

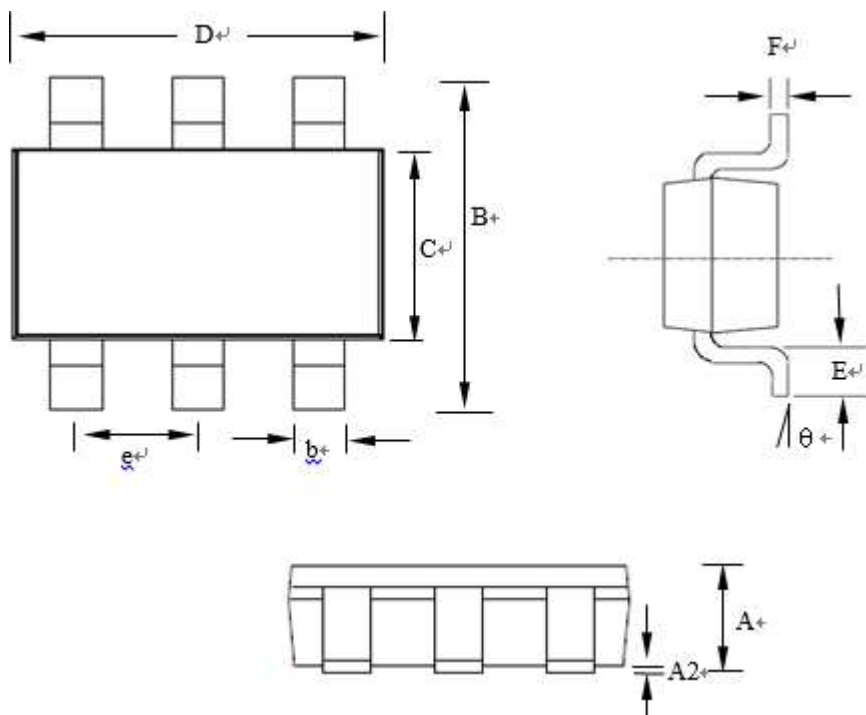


Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T_{smin})	150°C
Temperature Max. (T_{smax})	200°C
Time (t_s) from (T_{smin} to T_{smax})	60-120 seconds
Average Ramp-up Rate (t_L to t_P)	3°C/second max.
Liquidous Temperature (T_L)	217°C
Time (t_L) Maintained Above (T_L)	60 – 150 seconds
Peak Temperature	260°C +0°C / -5°C
Time (t_P) within 5°C of actual Peak Temperature	30 seconds
Ramp-down Rate (T_P to T_L)	6°C/second max
Time 25°C to Peak Temperature	8 minutes max.

➤ Ordering Information

Part Number	Description	Quantity
PAN20E60C	TSOP-6 Reel	3000 pcs

➤ Package Information (TSOP-6)



SYMBOLS	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	--	0.9	0.028	--	0.035
A2	0.00	--	0.10	0.000	--	0.004
B	2.60	2.80	3.00	0.102	0.110	0.118
C	1.40	1.60	1.80	0.055	0.063	0.071
D	2.70	2.90	3.10	0.106	0.114	0.122
E	0.30	0.40	0.60	0.012	0.016	0.024
F	0.07	0.127	0.20	0.003	0.005	0.008
b	0.30	0.40	0.50	0.012	0.016	0.020
e	--	0.95	--	--	0.037	--
θ	0°	5°	10°	0°	5°	10°

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