

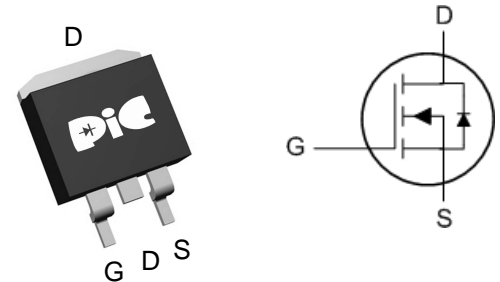
➤ General Description

This PAN30TP04P 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
- Advanced high cell densit Trench
- TO-263-2L package design

➤ TO-263-2L



➤ Application

- DC-DC Converters
- Power Management
- Analog Switch

➤ Absolute Maximum Ratings

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current, V_{GS} @ 10V ₁	$I_D @ T_C=25^\circ C$	65	A
Continuous Drain Current, V_{GS} @ 10V ₁	$I_D @ T_C=100^\circ C$	40	A
Continuous Drain Current, V_{GS} @ 10V ₁	$I_D @ T_A=25^\circ C$	12	A
Continuous Drain Current, V_{GS} @ 10V ₁	$I_D @ T_A=70^\circ C$	9.7	A
Pulsed Drain Current ₂	I_{DM}	130	A
Single Pulse Avalanche Energy ₃	EAS	58	mJ
Avalanche Current	I_{AS}	34	A
Total Power Dissipation ₄	$P_D @ T_C=25^\circ C$	58	W
Total Power Dissipation ₄	$P_D @ T_A=25^\circ C$	2	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 (Steady State) ₁	$R_{\theta JA}$	62	$^\circ C/W$
Thermal Resistance Junction-Case ₁	$R_{\theta JC}$	2.16	$^\circ C/W$

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	30	---	---	V
BVDSS Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to $25^\circ C, I_D=1mA$	---	0.027	---	$V/^\circ C$
Static Drain-Source On-Resistance ²	$R_{DS(ON)}$	$V_{GS}=10V, I_D=30A$	---	---	8.5	m Ω
		$V_{GS}=4.5V, I_D=15A$	---	---	14	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	---	2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		---	-5.8	---	$mV/^\circ C$
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=24V, V_{GS}=0V, T_J=25^\circ C$	---	---	1	μA
		$V_{DS}=24V, V_{GS}=0V, T_J=55^\circ C$	---	---	5	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
Forward Transconductance	g_{fs}	$V_{DS}=5V, I_D=30A$	---	38	---	S
Gate Resistance	R_g	$V_{DS}=0V, V_{GS}=0V, f=1MHz$	---	2.2	---	Ω
Total Gate Charge (4.5V)	Q_g	$V_{DS}=15V, V_{GS}=4.5V, I_D=15A$	---	12.6	---	nC
Gate-Source Charge	Q_{gs}		---	4.2	---	
Gate-Drain Charge	Q_{gd}		---	5.1	---	
Turn-On Delay Time	$T_{d(on)}$	$V_{DD}=15V, V_{GS}=10V, R_G=3.3\Omega, I_D=15A$	---	4.6	---	ns
Rise Time	T_r		---	12.2	---	
Turn-Off Delay Time	$T_{d(off)}$		---	26.6	---	
Fall Time	T_f		---	8	---	
Input Capacitance	C_{iss}	$V_{DS}=15V, V_{GS}=0V, f=1MHz$	---	1317	---	pF
Output Capacitance	C_{oss}		---	163	---	
Reverse Transfer Capacitance	C_{rss}		---	131	---	

➤ Diode Characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Continuous Source Current ^{1,5}	I_S	$V_G=V_D=0V, \text{Force Current}$	---	---	65	A
Pulsed Source Current ^{2,5}	I_{SM}		---	---	130	A
Diode Forward Voltage ²	V_{SD}	$V_{GS}=0V, I_S=1A, T_J=25^\circ C$	---	---	1.2	V
Reverse Recovery Time	t_{rr}	$I_F=30A, di/dt=100A/\mu s, T_J=25^\circ C$	---	9.2	---	nS
Reverse Recovery Charge	Q_{rr}		---	2	---	nC

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. The EAS data shows Max. rating. The test condition is $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=34A$
4. Ensure that the channel temperature does not exceed $150^\circ C$.
5. The data is theoretically the same as I_D and I_{DM} , in real applications, should be limited by total power dissipation.

➤ Typical Characteristics

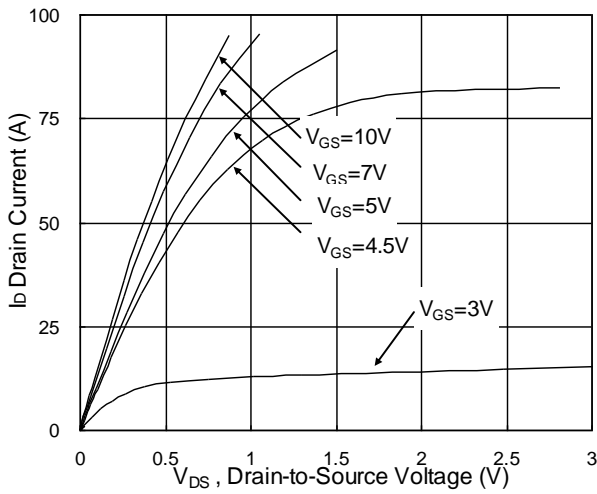


Fig.1 Typical Output Characteristics

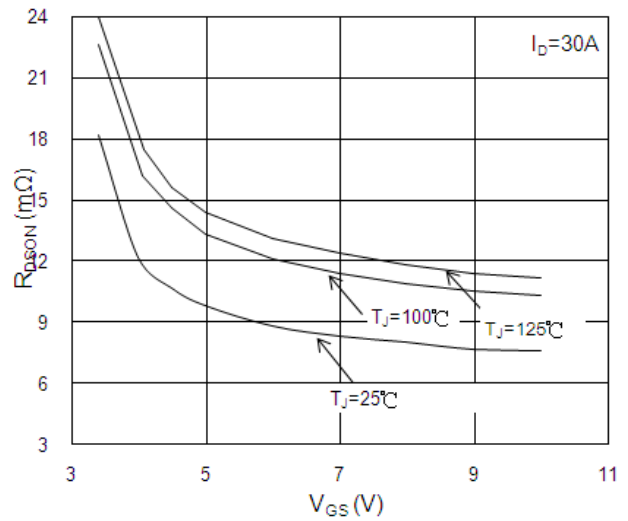


Fig.2 On-Resistance vs. G-S Voltage

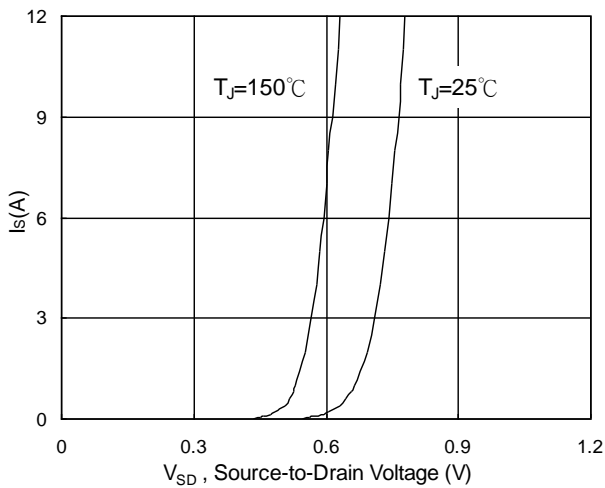


Fig.3 Forward Characteristics of Reverse

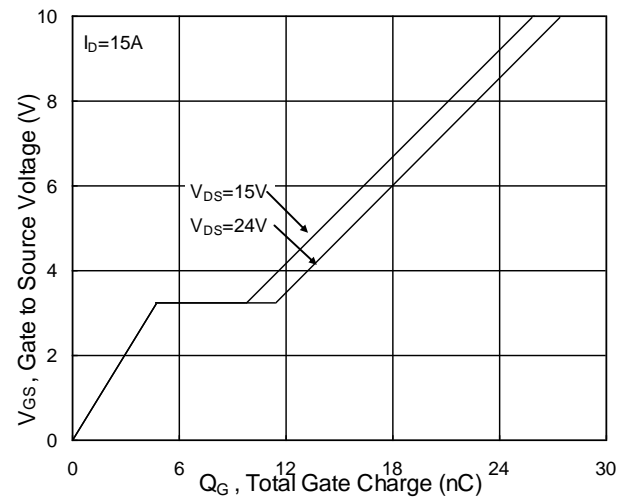


Fig.4 Gate-Charge Characteristics

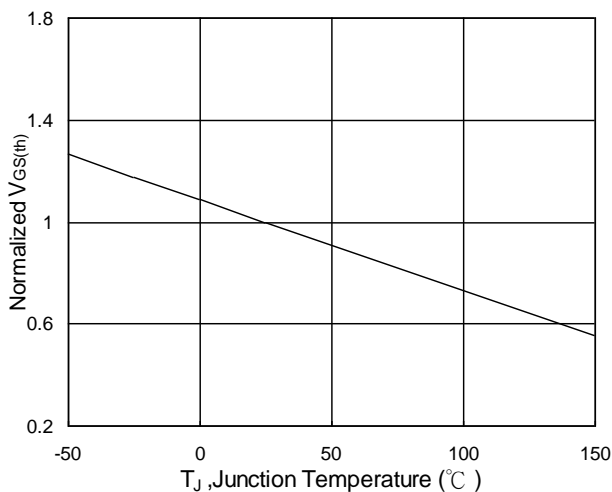


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

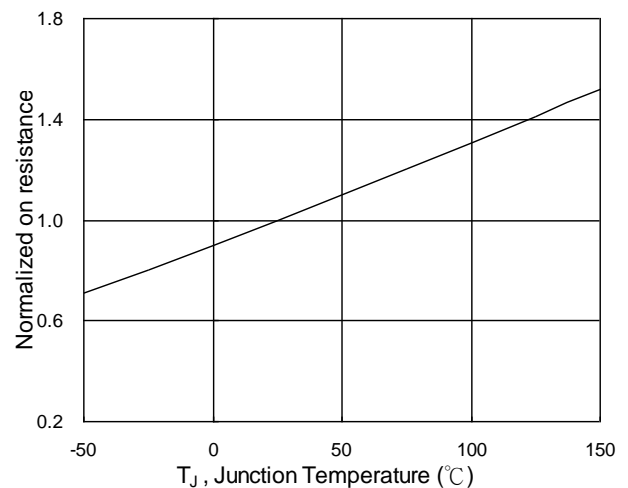


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

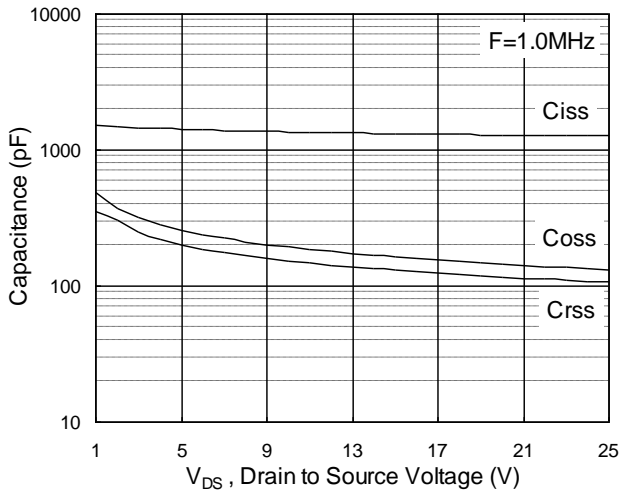


Fig.7 Capacitance

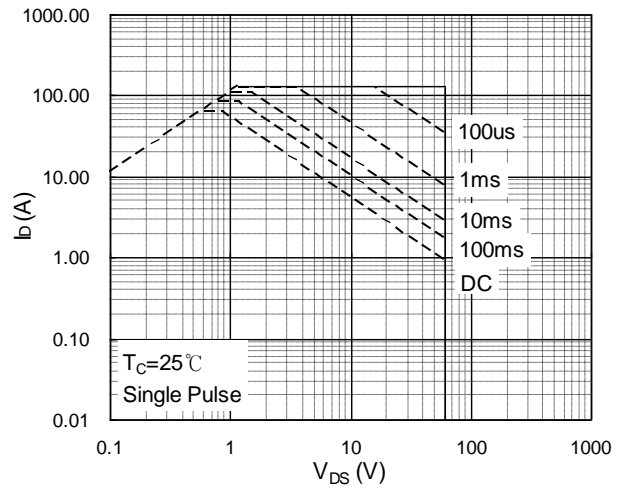


Fig.8 Safe Operating Area

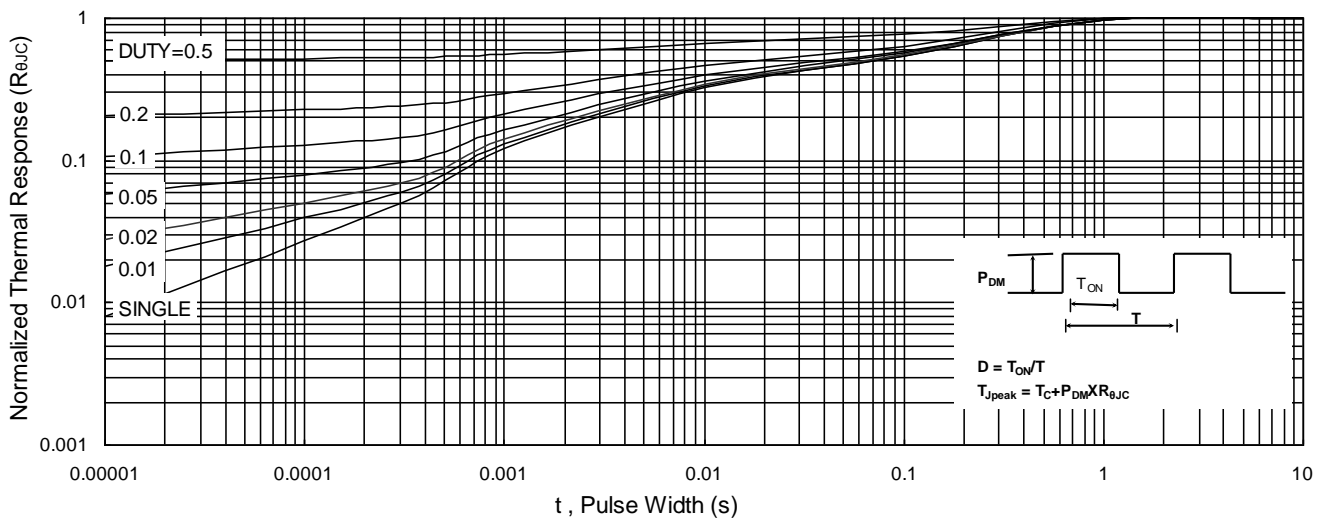


Fig.9 Normalized Maximum Transient Thermal Impedance

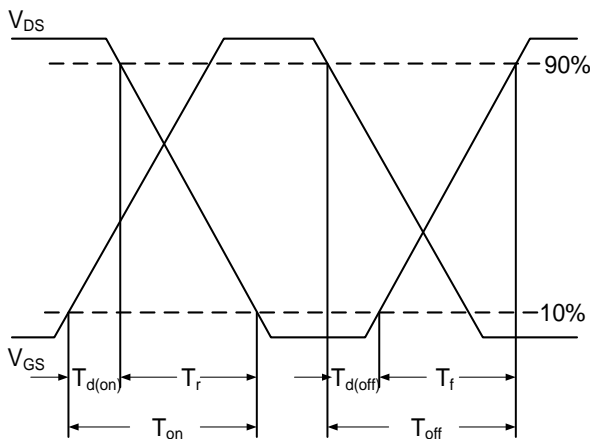


Fig.10 Switching Time Waveform

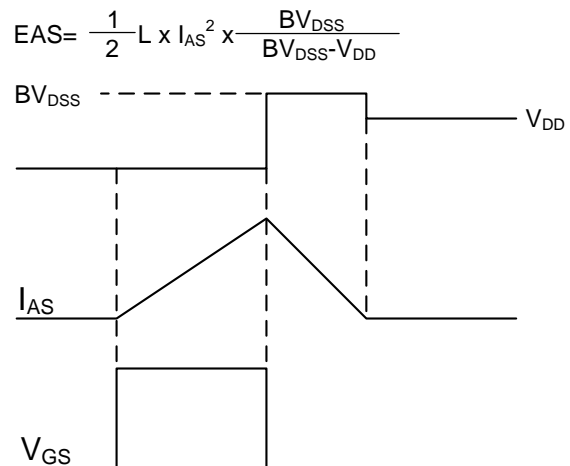


Fig.11 Unclamped Inductive Switching Waveform

➤ Recommend IR Reflow Soldering Thermal Profile

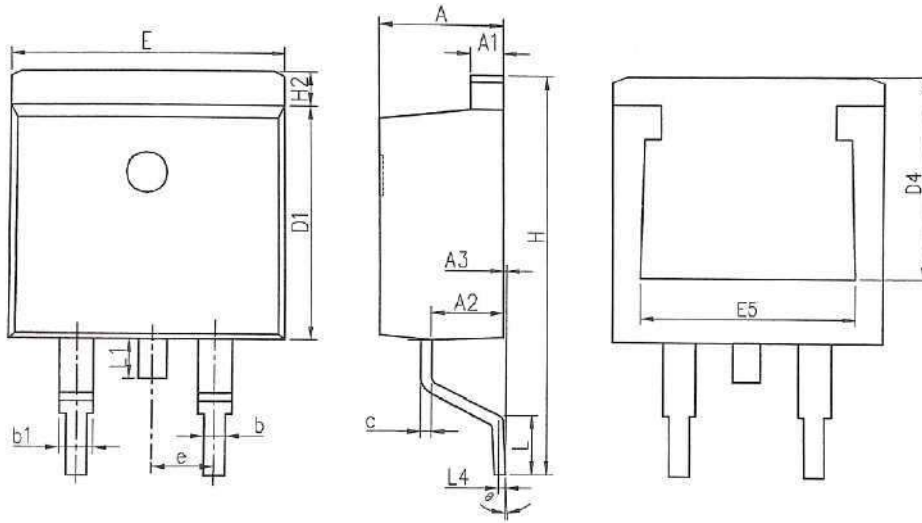


Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T _{smin})	150°C
Temperature Max. (T _{smax})	200°C
Time (t _s) from (T _{smin} to T _{smax})	60-120 seconds
Average Ramp-up Rate (t _L to t _P)	3°C/second max.
Liquidous Temperature (T _L)	217°C
Time (t _L) Maintained Above (T _L)	60 – 150 seconds
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
PAN30TP04P	TO-263-2L Reel	800 pcs

➤ Package Information (TO-263-2L)



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.370	4.770	0.172	0.188
A1	1.220	1.420	0.048	0.056
A2	2.200	2.890	0.087	0.114
A3	0.000	0.250	0.000	0.010
b	0.700	0.960	0.028	0.038
b1	1.170	1.470	0.046	0.058
c	0.300	0.530	0.012	0.021
D1	8.500	9.300	0.335	0.366
D4	6.600	-	0.260	-
E	9.860	10.36	0.388	0.408
E5	7.060	-	0.278	-
e	2.540 BSC		0.100 BSC	
H	14.70	15.70	0.579	0.618
H2	1.070	1.470	0.042	0.058
L	2.000	2.600	0.079	0.102
L1	1.400	1.750	0.055	0.069
L4	0.250 BSC		0.010 BSC	
Ø	0°	9°	0°	9°

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