

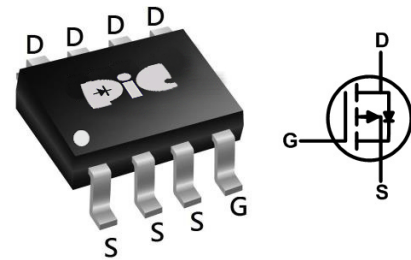
➤ General Description

This PAP31TJ03J P-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
- 100% EAS Guaranteed
- Green Device Available
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology

➤ SOP-8



➤ Application

- Notebook CPU Core-High-Side 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, $V_{GS} @ -10V_1$	$I_D @ T_A = 25^\circ C$	-7.5	A
Continuous Drain Current, $V_{GS} @ -10V_1$	$I_D @ T_A = 70^\circ C$	-5.8	A
Pulsed Drain Current ²	I_{DM}	-50	A
Single Pulse Avalanche Energy ³	EAS	72.2	mJ
Avalanche Current	I_{AS}	-38	A
Total Power Dissipation ⁴	$P_D @ T_A = 25^\circ C$	2.5	W
Total Power Dissipation ⁴	$P_D @ T_A = 70^\circ C$	1.6	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	$R_{\theta JA}$	85	$^\circ C/W$
Thermal Resistance Junction-Case ¹	$R_{\theta JC}$	36	$^\circ C/W$

➤ 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
BV_{DSS} Temperature Coefficient	$\Delta BV_{DSS} / \Delta T_J$	Reference to $25^\circ C$, $I_D = -1mA$	---	-0.022	---	$V/^\circ C$
Static Drain-Source On-Resistance ²	$R_{DS(ON)}$	$V_{GS} = -10V$, $I_D = -6A$	---	---	20	m Ω
		$V_{GS} = -4.5V$, $I_D = -4A$	---	---	32	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}$, $I_D = -250\mu A$	-1.0	---	-2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		---	4.6	---	$mV/^\circ C$
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = -24V$, $V_{GS} = 0V$, $T_J = 25^\circ C$	---	---	-1	uA
		$V_{DS} = -24V$, $V_{GS} = 0V$, $T_J = 55^\circ C$	---	---	-5	
Gate-Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20V$, $V_{DS} = 0V$	---	---	± 100	nA
Forward Transconductance	g_{fs}	$V_{DS} = -5V$, $I_D = -6A$	---	17	---	S
Gate Resistance	R_g	$V_{DS} = 0V$, $V_{GS} = 0V$, $f = 1MHz$	---	13	---	Ω
Total Gate Charge (-4.5V)	Q_g	$V_{DS} = -15V$, $V_{GS} = -4.5V$, $I_D = -6A$	---	12.6	---	nC
Gate-Source Charge	Q_{gs}		---	4.8	---	
Gate-Drain Charge	Q_{gd}		---	4.8	---	
Turn-On Delay Time	$T_{d(on)}$	$V_{DD} = -15V$, $V_{GS} = -10V$, $R_G = 3.3\Omega$, $I_D = -6A$	---	4.6	---	ns
Rise Time	T_r		---	14.8	---	
Turn-Off Delay Time	$T_{d(off)}$		---	41	---	
Fall Time	T_f		---	19.6	---	
Input Capacitance	C_{iss}	$V_{DS} = -15V$, $V_{GS} = 0V$, $f = 1MHz$	---	1345	---	pF
Output Capacitance	C_{oss}		---	194	---	
Reverse Transfer Capacitance	C_{rss}		---	158	---	

➤ Diode Characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Continuous Source Current ^{1,5}	I_S	$V_G = V_D = 0V$, Force Current	---	---	-7.5	A
Pulsed Source Current ^{2,5}	I_{SM}		---	---	-50	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}	$I_F = -6A$, $dI/dt = 100A/\mu s$, $T_J = 25^\circ C$	---	16.3	---	nS
Reverse Recovery Charge	Q_{rr}		---	5.9	---	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 $V_{DD} = -25V$, $V_{GS} = -10V$, $L = 0.1mH$, $I_{AS} = -38A$
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

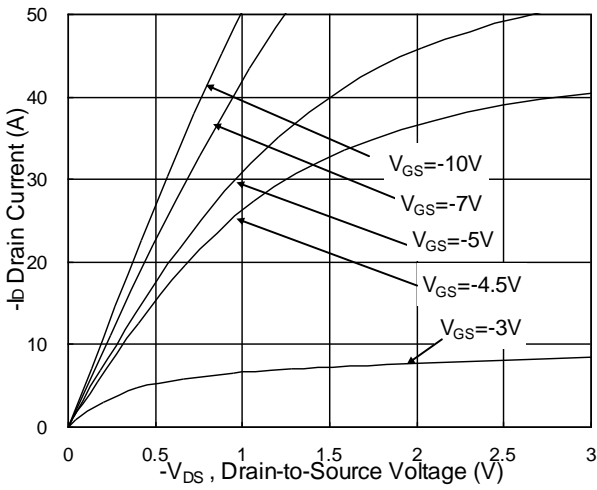


Fig.1 Typical Output Characteristics

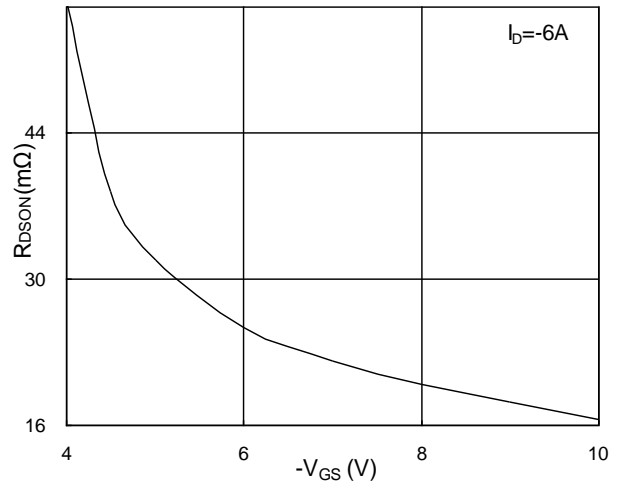


Fig.2 On-Resistance v.s Gate-Source

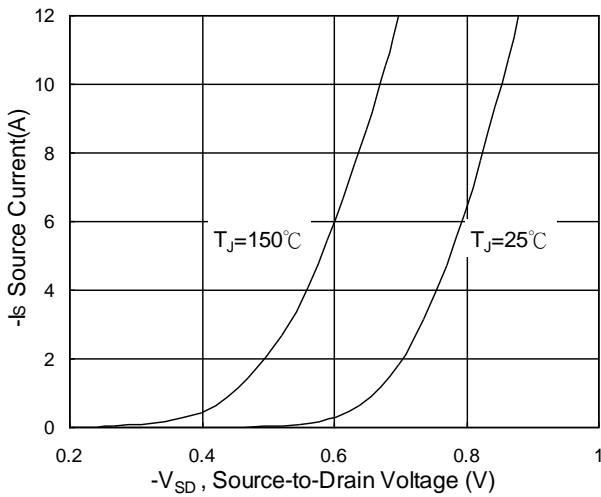


Fig.3 Forward Characteristics of Reverse

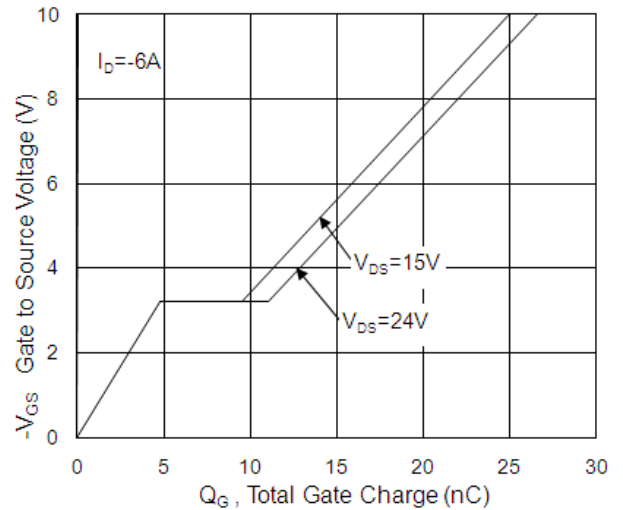


Fig.4 Gate-Charge Characteristics

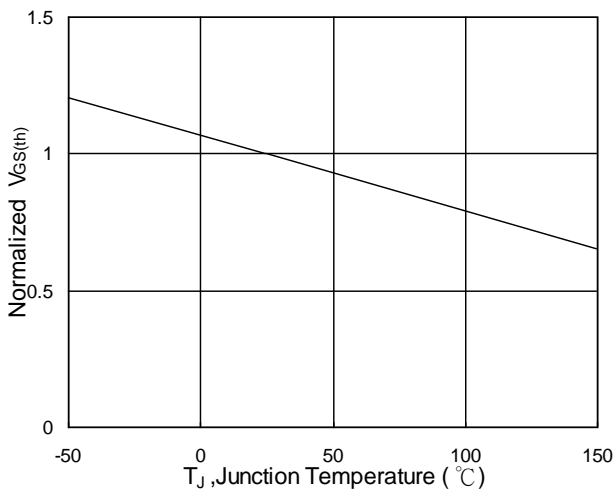


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

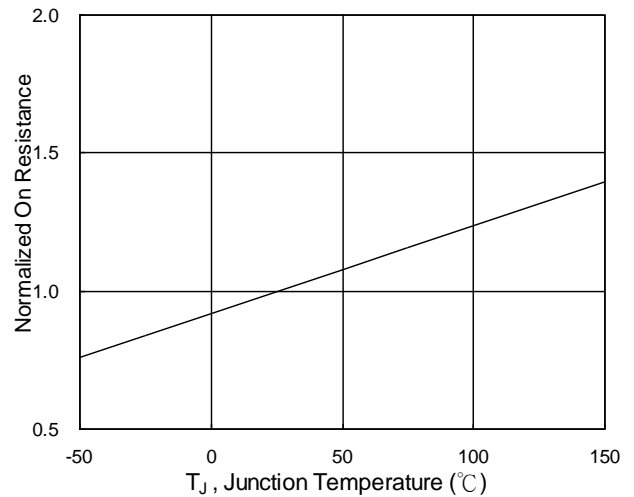


Fig.6 Normalized $R_{DS(ON)}$ vs. T_J

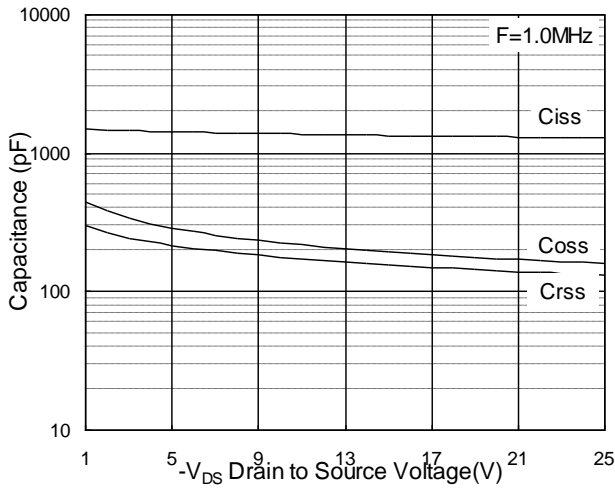


Fig.7 Capacitance

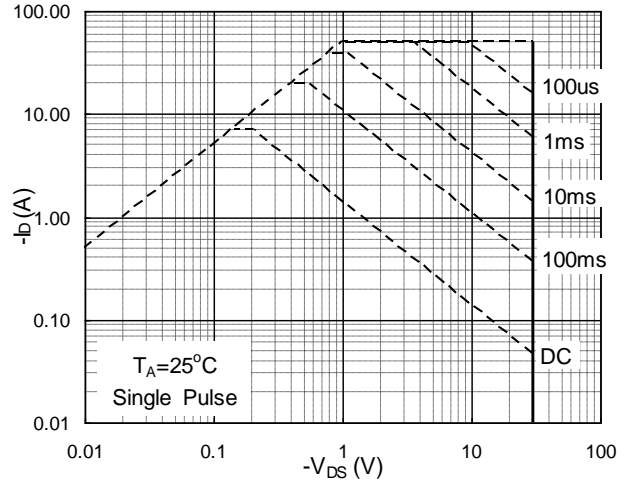


Fig.8 Safe Operating Area

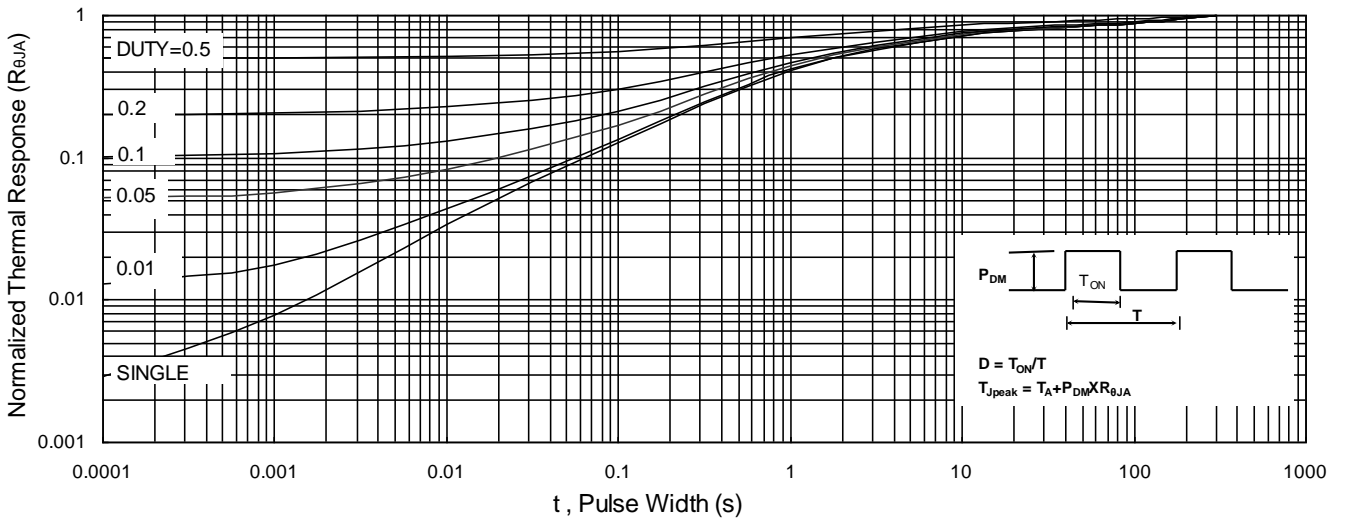


Fig.9 Normalized Maximum Transient Thermal Impedance

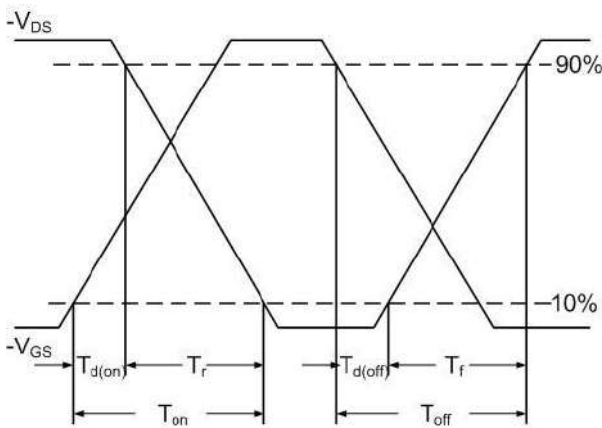


Fig.10 Switching Time Waveform

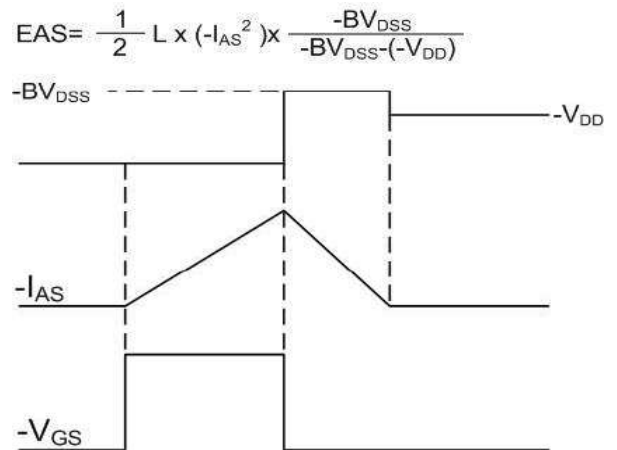


Fig.11 Unclamped Inductive Switching Waveform

➤ Recommand IR Reflow Soldering Thermal Profile

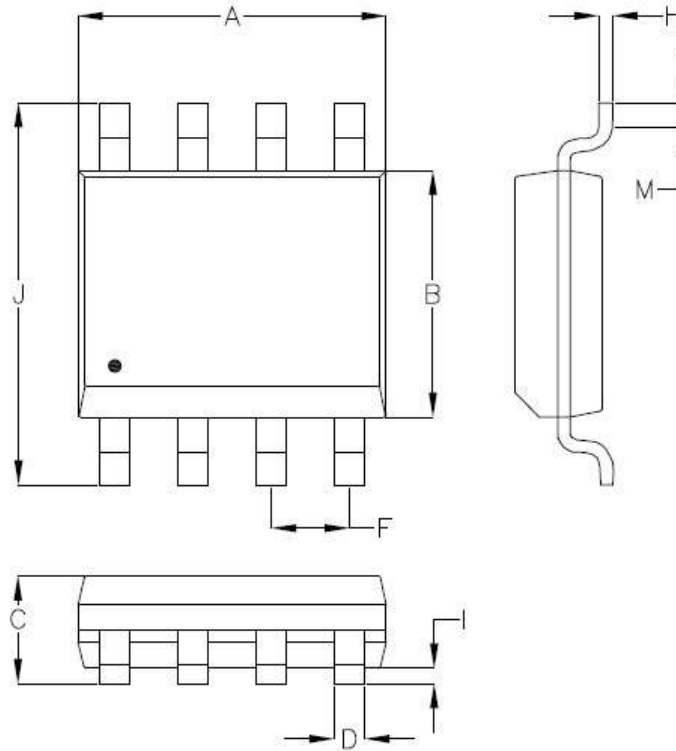


Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T _{smin})	150°C
Temperature Max. (T _{smax})	200°C
Time (t _s) from (T _{smin} to T _{smax})	60-120 seconds
Average Ramp-up Rate (t _L to t _P)	3°C/second max.
Liquidous Temperature (T _L)	217°C
Time (t _L) Maintained Above (T _L)	60 – 150 seconds
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
PAP31TJ03J	SOP-8 Reel	2500 pcs

➤ Package Information (SOP-8)



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.700	5.150	0.185	0.203
B	3.700	4.100	0.146	0.161
C	1.23	1.753	0.048	0.069
D	0.310	0.510	0.012	0.020
F	1.070	1.470	0.042	0.058
H	0.160	0.254	0.006	0.010
I	0.050	0.254	0.002	0.010
J	5.750	6.250	0.226	0.246
M	0.400	1.270	0.016	0.050

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