

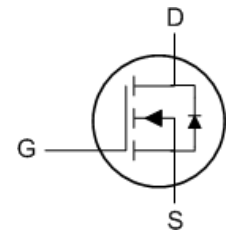
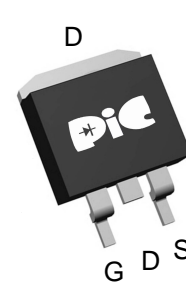
### ➤ General Description

This PAN90TP04SP 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

- 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

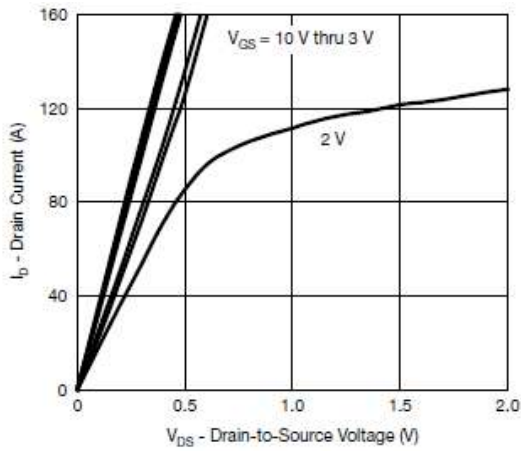
### ➤ Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	40	V
Gate -Source Voltage	$V_{GSS}$	$\pm 20$	V
Continuous Drain Current( $T_J=150^\circ C$ )	$I_D$	$T_C=25^\circ C$	90
		$T_C=70^\circ C$	90
Pulsed Drain Current	$I_{DM}$	160	A
Continuous Source Current(Diode Conduction)	$I_S$	80	
Single Pulse Avalanche Current	$I_{AS}$	40	
Power Dissipation	$P_D$	$T_C=25^\circ C$	250
		$T_A=25^\circ C$	3.75
Operating Junction Temperature	$T_J$	150	$^\circ C$
Storage Temperature Range	$T_{STG}$	-55/150	$^\circ C$
Thermal Resistance-Junction to Ambient	$R_{\theta JA}$	62.5	$^\circ C/W$

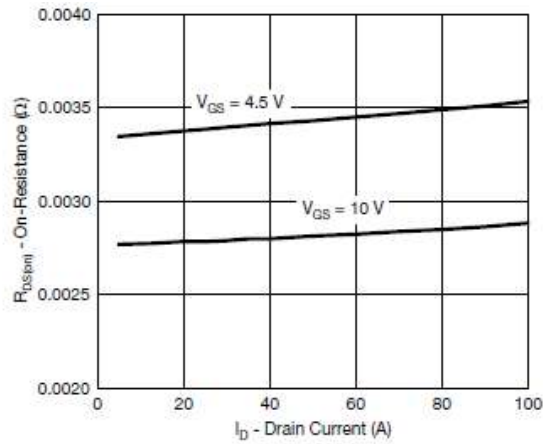
➤ **Electrical Characteristics (T<sub>J</sub> =25°C Unless otherwise noted)**

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	40			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0		2.0	
Gate Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=32V, V_{GS}=0V$			1	uA
		$V_{DS}=32V, V_{GS}=0V$ $T_J=85^\circ C$			10	
On-State Drain Current	$I_{D(on)}$	$V_{DS} \geq 10V, V_{GS}=10V$	50			A
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=25A$		2.78	3.3	mΩ
		$V_{GS}=4.5V, I_D=20A$		3.58	4.1	
Forward Transconductance	$g_{FS}$	$V_{DS}=15V, I_D=15A$		75		S
Diode Forward Voltage	$V_{SD}$	$I_S=10A, V_{GS}=0V$		0.85	1.3	V
<b>Dynamic</b>						
Total Gate Charge	$Q_g$	$V_{DS}=20V, V_{GS}=10V$ $I_D=20A$		60	100	nC
Gate-Source Charge	$Q_{gs}$			12		
Gate-Drain Charge	$Q_{gd}$			10		
Input Capacitance	$C_{iss}$	$V_{DS}=20V, V_{GS}=0V$ $f=1MHz$		4500		pF
Output Capacitance	$C_{oss}$			520		
Reverse Transfer Capacitance	$C_{riss}$			180		
Turn-On Time	$t_{d(on)}$	$V_{DD}=20V, R_L=2\Omega$ $I_D=10A, V_{GEN}=10V$ $R_G=1\Omega$		10	20	ns
	$t_r$			8	18	
Turn-Off Time	$t_{d(off)}$			40	75	
	$t_f$			8	18	

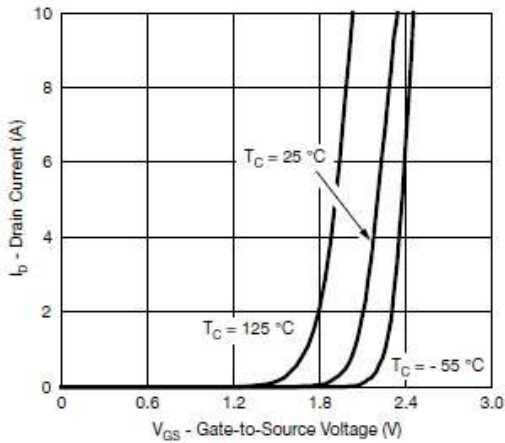
### ➤ Typical Characteristics



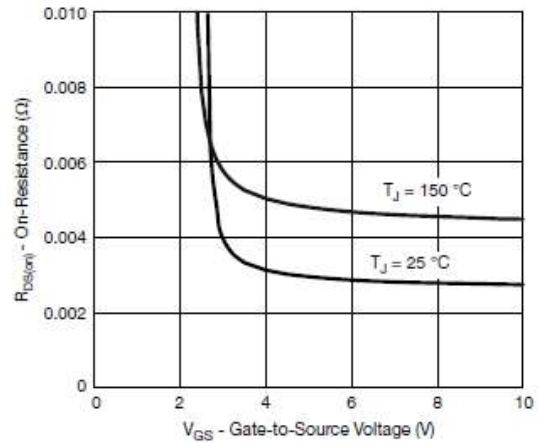
**Output Characteristics**



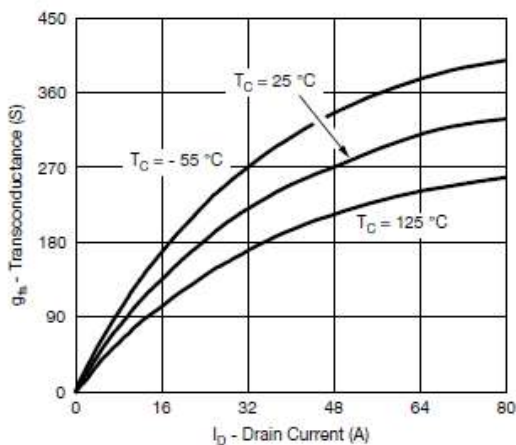
**On-Resistance vs. Drain Current**



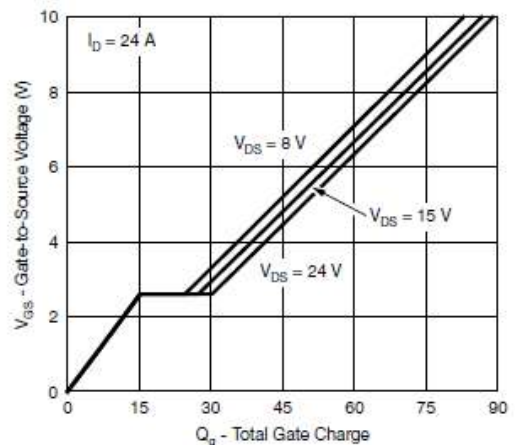
**Transfer Characteristics**



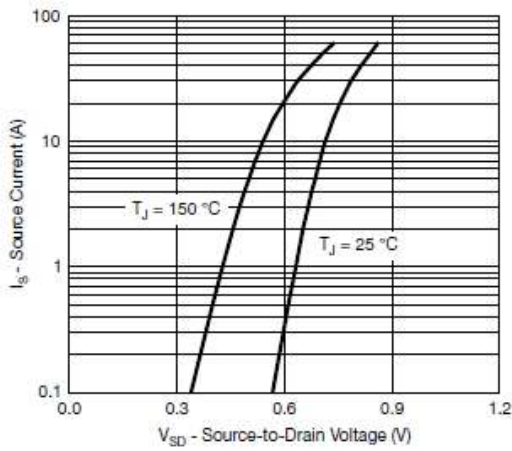
**On-Resistance vs. Gate-to-Source Voltage**



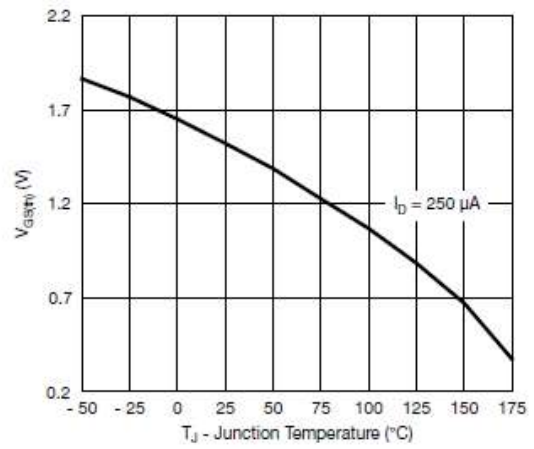
**Transconductance**



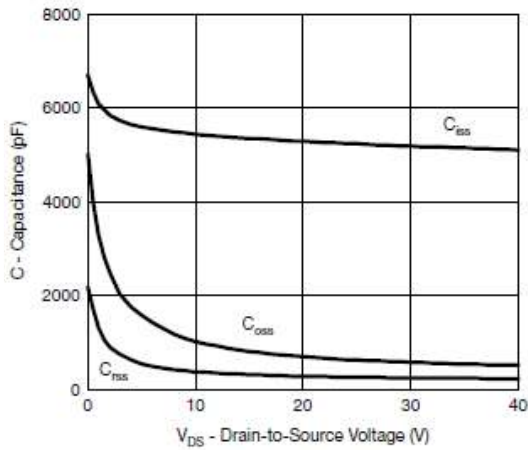
**Gate Charge**



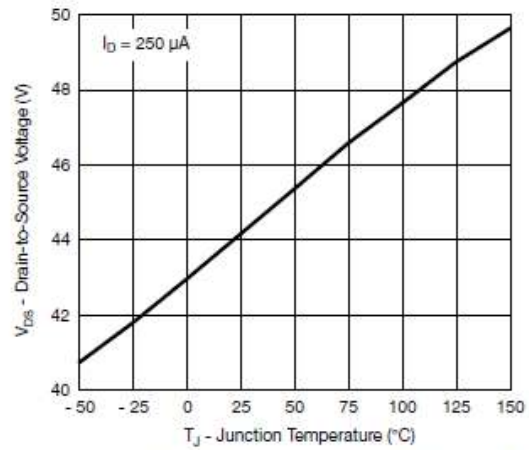
Source-Drain Diode Forward Voltage



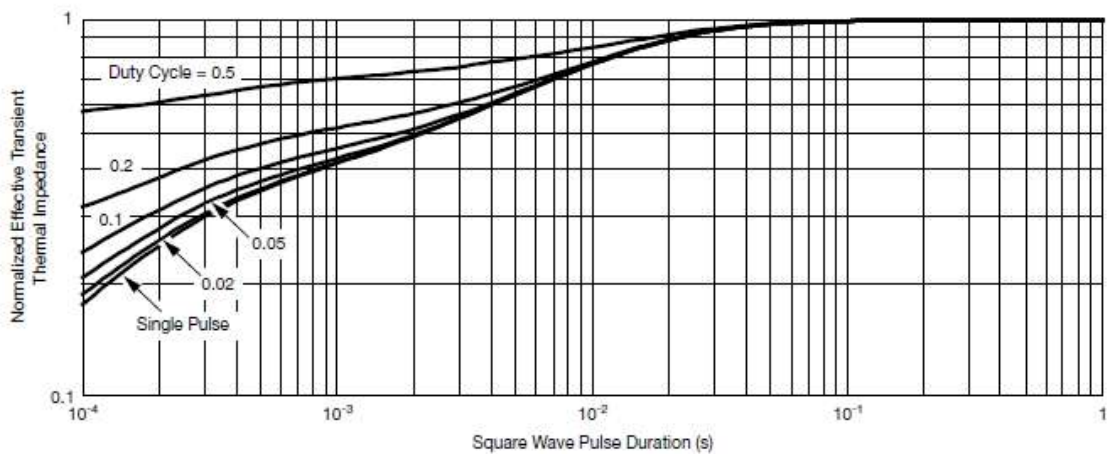
Threshold Voltage



Capacitance

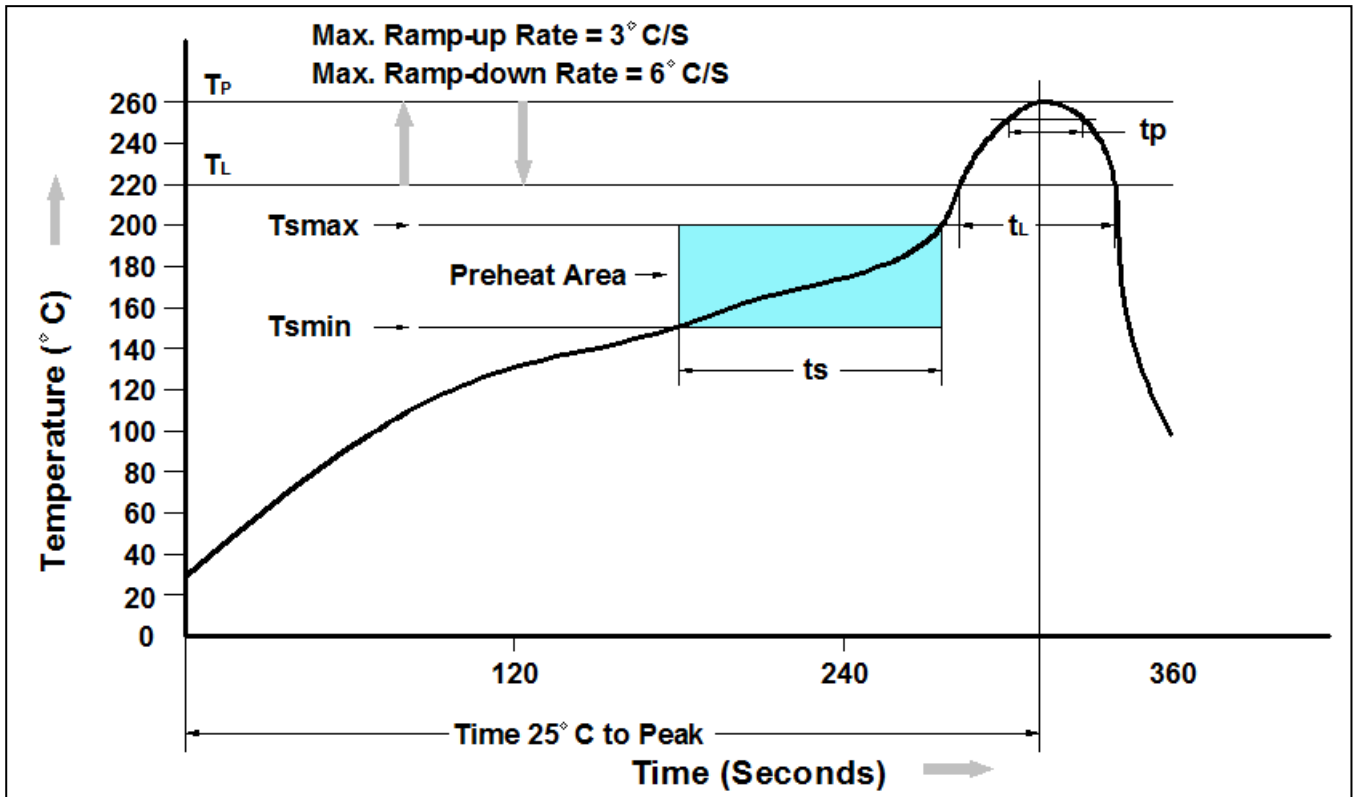


Drain Source Breakdown vs. Junction Temperature



Normalized Thermal Transient Impedance, Junction-to-Case

➤ Recommend IR Reflow Soldering Thermal Profile

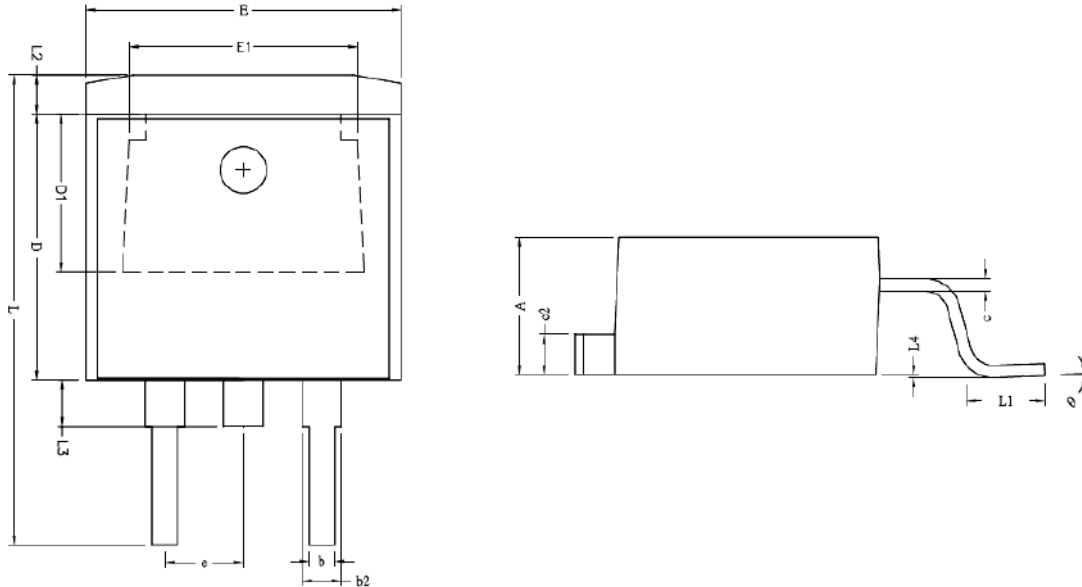


Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T <sub>smin</sub> )	150°C
Temperature Max. (T <sub>smax</sub> )	200°C
Time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</sub> )	60-120 seconds
Average Ramp-up Rate (t <sub>L</sub> to t <sub>P</sub> )	3°C/second max.
Liquidous Temperature (T <sub>L</sub> )	217°C
Time (t <sub>L</sub> ) Maintained Above (T <sub>L</sub> )	60 – 150 seconds
Peak Temperature	260°C +0°C / -5°C
Time (t <sub>P</sub> ) within 5°C of actual Peak Temperature	30 seconds
Ramp-down Rate (T <sub>P</sub> to T <sub>L</sub> )	6°C/second max
Time 25°C to Peak Temperature	8 minutes max.

➤ Ordering Information

Part Number	Description	Quantity
PAN90TP04SP	TO-263-2L Reel	800 pcs

### ➤ Package Information ( TO-263-2L )



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	4.40	4.80	c2	1.25	1.45
b	0.76	1.0	b2	1.17	1.47
L4	0.00	0.254	D	8.6	9.0
c	0.36	0.50	D1	5.10 REF.	
L3	1.50 REF.		e	2.54 REF.	
L1	2.29	2.79	L	14.6	15.8
E	9.80	10.4	$\theta$	$0^\circ \pm 3^\circ$	
E1	7.40 REF.		L2	1.27 REF.	

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