

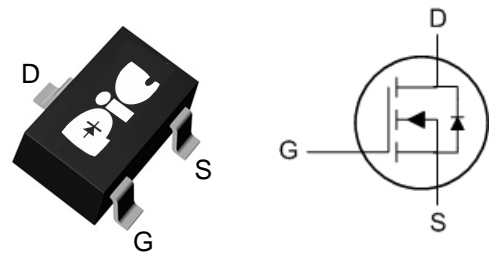
## ➤ General Description

This PAN2412R 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 high density cell design for extremely low  $R_{DS(ON)}$
- Exceptional on-resistance and maximum DC current capability
- SOT-323 package design

## ➤ SOT-323



## ➤ Application

- Portable Equipment
- Battery Powered System
- Net Working System

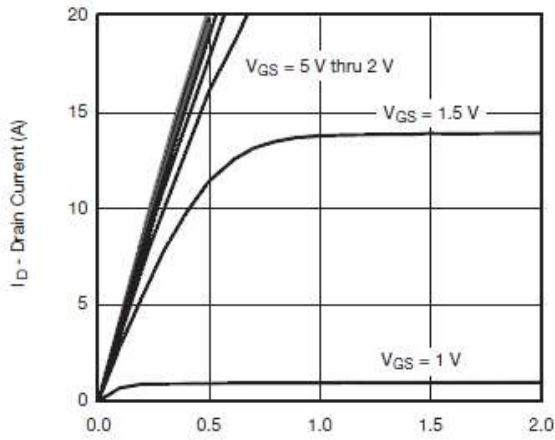
## ➤ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DSS}$	20	V
Gate –Source Voltage	$V_{GSS}$	$\pm 12$	V
Continuous Drain Current( $T_J=150^\circ C$ )	$I_D$	$T_A=25^\circ C$	3.8
		$T_A=70^\circ C$	2.6
Pulsed Drain Current	$I_{DM}$	10	A
Continuous Source Current(Diode Conduction)	$I_S$	1.6	A
Power Dissipation	$P_D$	$T_A=25^\circ C$	0.35
		$T_A=70^\circ C$	0.22
Operating Junction Temperature	$T_J$	150	$^\circ C$
Storage Temperature Range	$T_{STG}$	-55/150	$^\circ C$
Thermal Resistance-Junction to Ambient	$R_{\theta JA}$	120	$^\circ C/W$

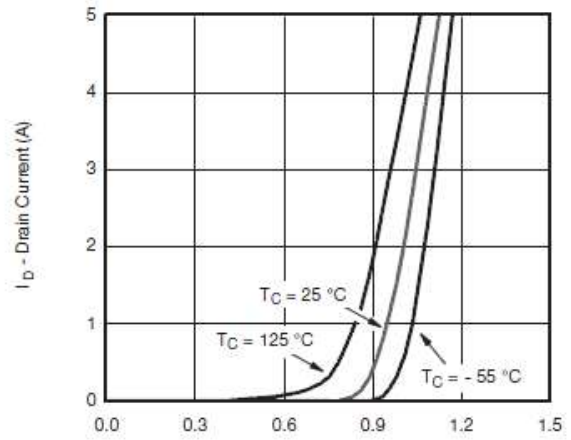
### ➤ Electrical Characteristics ( $T_A=25^\circ C$ Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	20			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.4		0.8	
Gate Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 12V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=16V, V_{GS}=0V$			1	uA
		$V_{DS}=16V, V_{GS}=0V$ $T_J=85^\circ C$			10	
On-State Drain Current	$I_{D(on)}$	$V_{DS} \geq 5V, V_{GS}=4.5V$	6			A
		$V_{DS} \geq 5V, V_{GS}=2.5V$	4			
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=3.8A$		48	52	m $\Omega$
		$V_{GS}=2.5V, I_D=3.2A$		52	56	
		$V_{GS}=1.8V, I_D=2.6A$		62	68	
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=3.6A$		10		S
Diode Forward Voltage	$V_{SD}$	$I_S=1.6A, V_{GS}=0V$		0.85	1.2	V
<b>Dynamic</b>						
Total Gate Charge	$Q_g$	$V_{DS}=10V, V_{GS}=4.5V$ $I_D=4.0A$		8.2	14	nC
Gate-Source Charge	$Q_{gs}$			1.2		
Gate-Drain Charge	$Q_{gd}$			1.0		
Input Capacitance	$C_{iss}$	$V_{DS}=10V, V_{GS}=0V$ $f=1MHz$		850		pF
Output Capacitance	$C_{oss}$			120		
Reverse Transfer Capacitance	$C_{rss}$			60		
Turn-On Time	$t_{d(on)}$	$V_{DD}=10V, R_L=2.2\Omega$ $I_D=4.0A, V_{GEN}=4.5V$ $R_G=1\Omega$		10	16	ns
	$t_r$			16	25	
Turn-Off Time	$t_{d(off)}$			31	45	
	$t_f$			10	16	

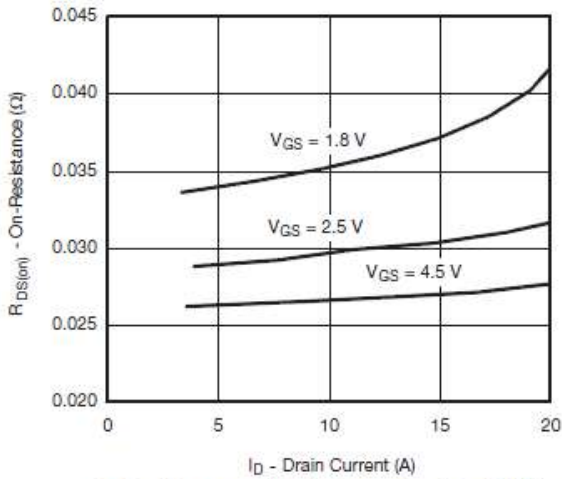
## ➤ Typical Characteristics



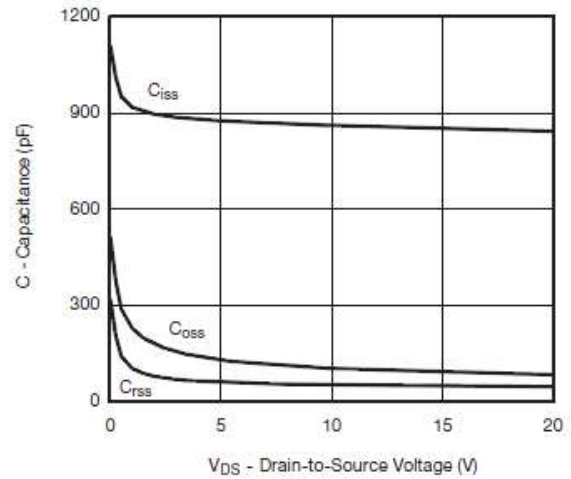
**Output Characteristics**



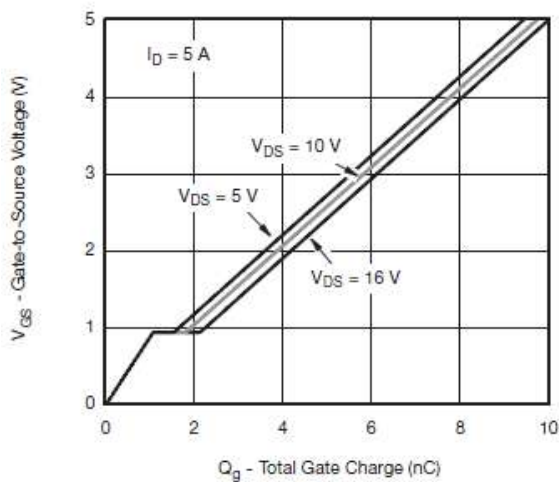
**Transfer Characteristics**



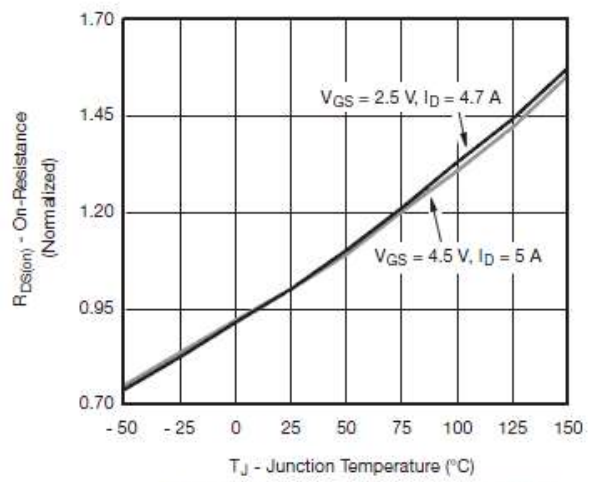
**On-Resistance vs. Drain Current and Gate Voltage**



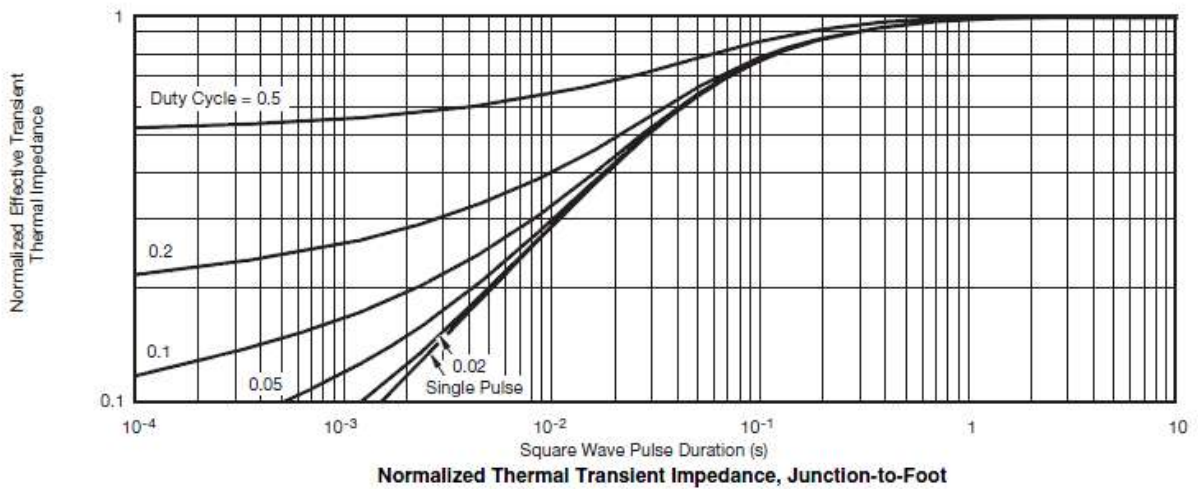
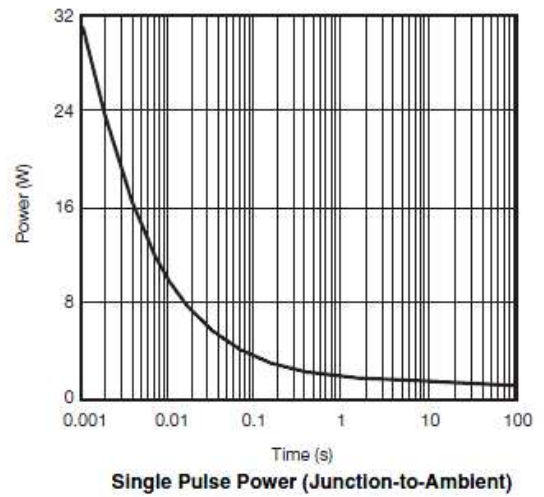
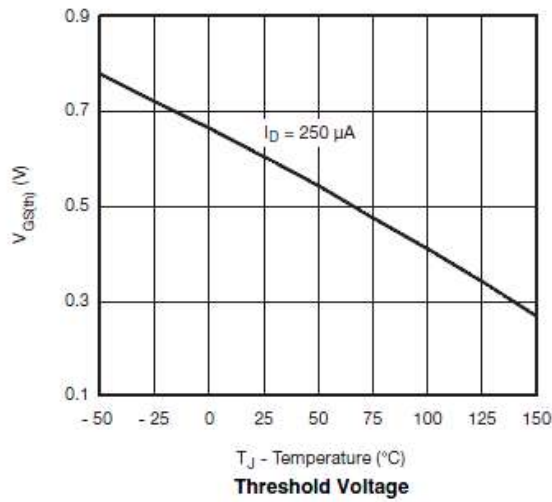
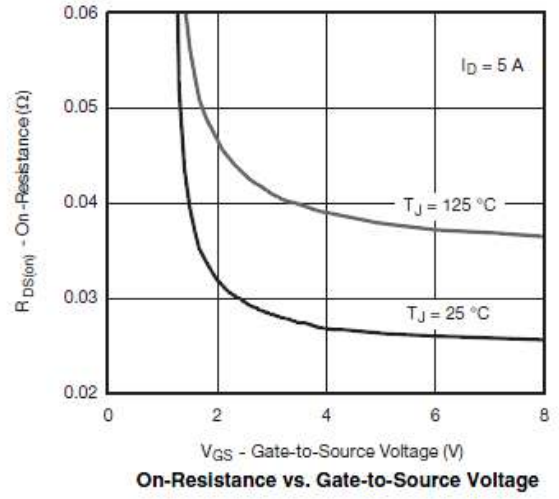
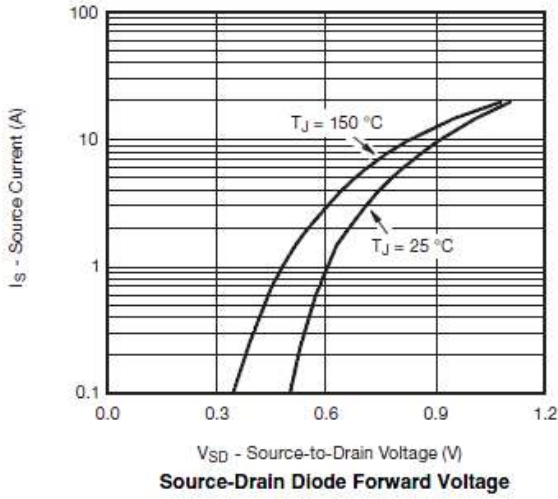
**Capacitance**



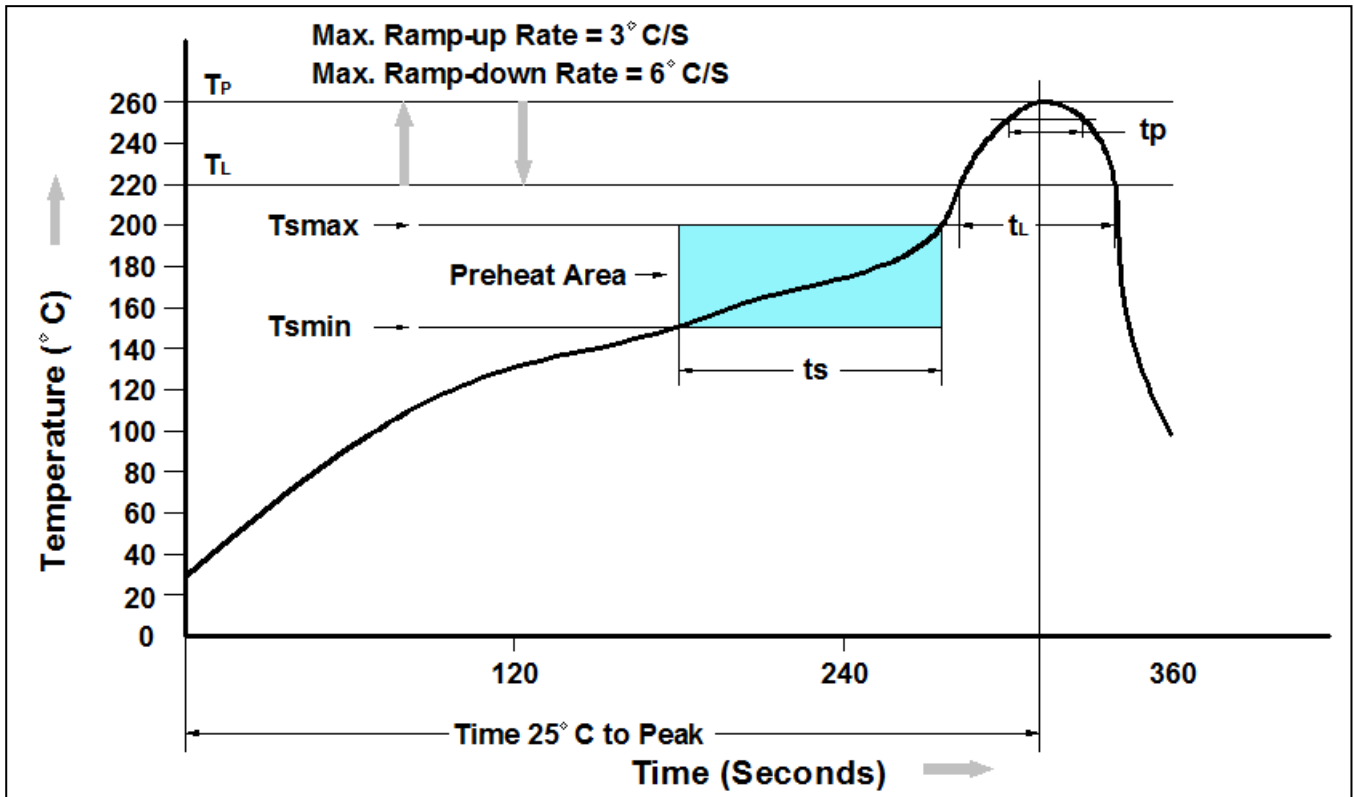
**Gate Charge**



**On-Resistance vs. Junction Temperature**



➤ Recommnd IR Reflow Soldering Thermal Profile

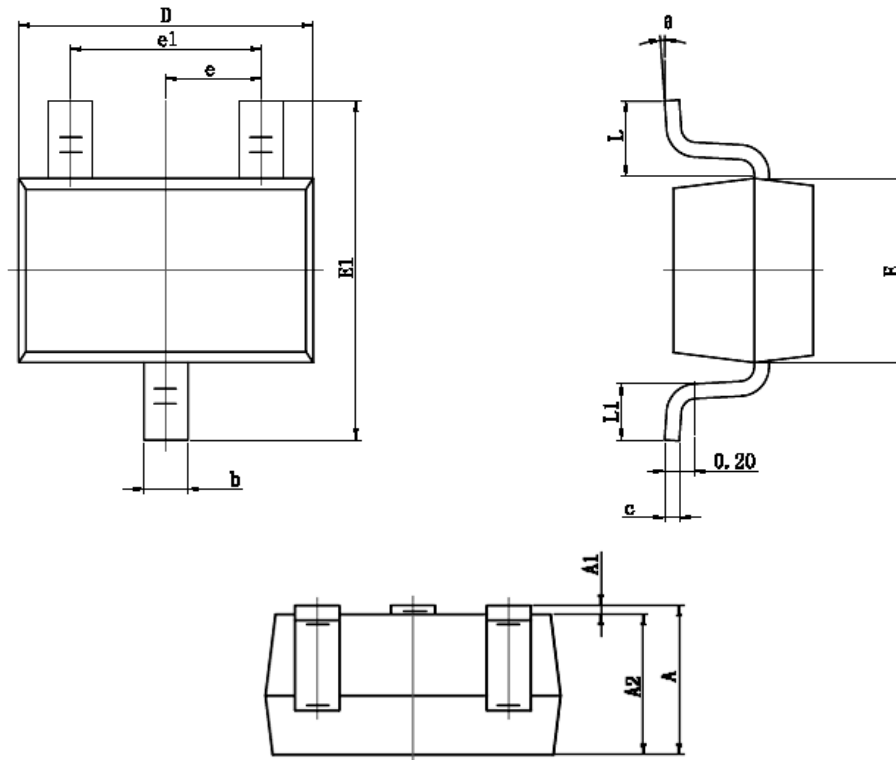


Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T <sub>smin</sub> )	150°C
Temperature Max. (T <sub>smax</sub> )	200°C
Time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</sub> )	60-120 seconds
Average Ramp-up Rate (t <sub>L</sub> to t <sub>P</sub> )	3°C/second max.
Liquidous Temperature (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
PAN2412R	SOT-323 Reel	3000 pcs

➤ Package Information ( SOT-323 )



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.200	0.400	0.008	0.016
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
$\theta$	0°	8°	0°	8°

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