

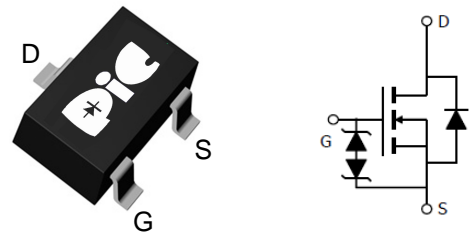
## ➤ General Description

This PAN1023ER 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
- ESD Protection Diode design-in
- SOT-323 package design

## ➤ SOT-323



## ➤ Application

- Drivers: Relays, Solenoids, Lamps, Hammers, Display, Memories, Transistors, etc.
- High saturation current capability. Direct Logic-Level Interface: TTL/CMOS
- Battery Operated Systems
- Solid-State Relays

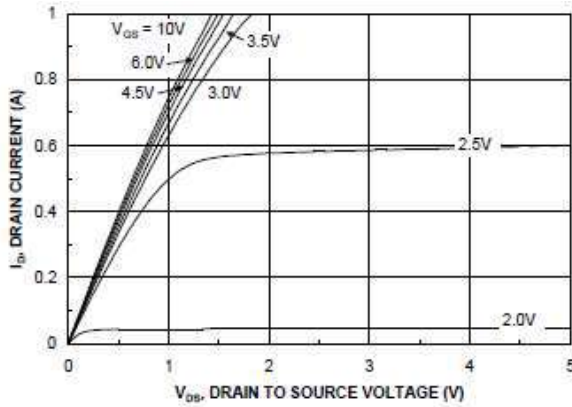
## ➤ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DSS}$	100	V
Gate -Source Voltage	$V_{GSS}$	$\pm 20$	V
Continuous Drain Current( $T_J=150^\circ C$ )	$I_D$	$T_A=25^\circ C$	0.17
		$T_A=70^\circ C$	0.17
Pulsed Drain Current	$I_{DM}$	0.68	A
Continuous Source Current(Diode Conduction)	$I_S$	0.4	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	150
Storage Temperature Range	$T_{STG}$	-55/150	-55/150
Thermal Resistance-Junction to Ambient	$R_{\theta JA}$	120	120

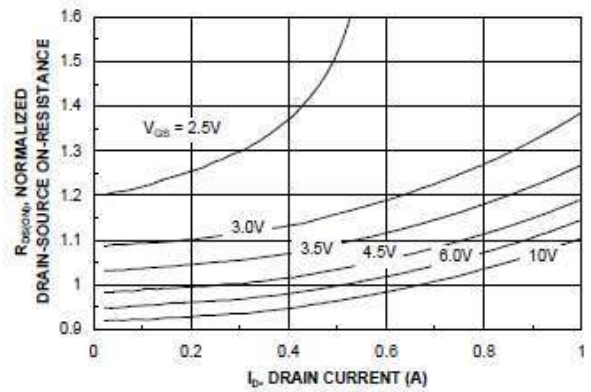
➤ **Electrical Characteristics (T<sub>A</sub>=25°C Unless otherwise noted)**

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	100			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0		3.0	V
Gate Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$			10	$\mu A$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=80V, V_{GS}=0V$			1	$\mu A$
		$V_{DS}=80V, V_{GS}=0V$ $T_J=85^\circ C$			10	
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=0.17A$		4.0	5.8	$\Omega$
		$V_{GS}=4.5V, I_D=0.17A$		4.6	6.8	
Forward Transconductance	$g_{FS}$	$V_{DS}=10V, I_D=0.17A$		0.8		S
Diode Forward Voltage	$V_{SD}$	$I_S=0.17A, V_{GS}=0V$		0.75	1.3	V
<b>Dynamic</b>						
Total Gate Charge	$Q_g$	$V_{DS}=30V, V_{GS}=10V$ $I_D=0.22A$		1.8	3.5	nC
Gate-Source Charge	$Q_{gs}$			0.2		
Gate-Drain Charge	$Q_{gd}$			0.3		
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V$ $f=1MHz$		70		pF
Output Capacitance	$C_{oss}$			8		
Reverse Transfer Capacitance	$C_{rss}$			5		
Turn-On Time	$t_{d(on)}$	$V_{DD}=30V, R_G=50\Omega$ $I_D=0.28A, V_{GEN}=10V$		5	10	ns
	$t_r$			5	10	
Turn-Off Time	$t_{d(off)}$			7	15	
	$t_f$			10	20	

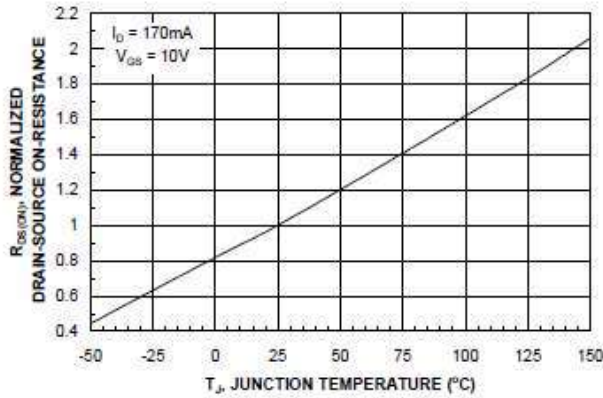
## ➤ Typical Characteristics



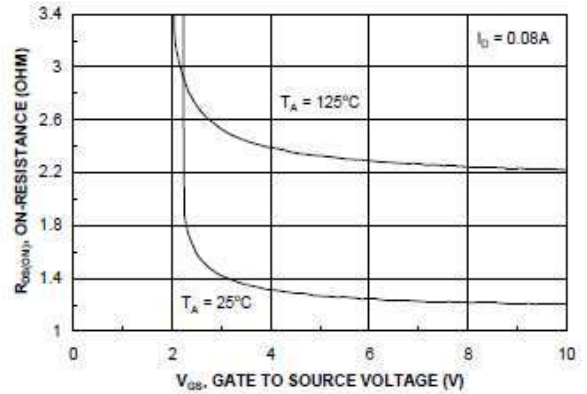
On-Region Characteristics



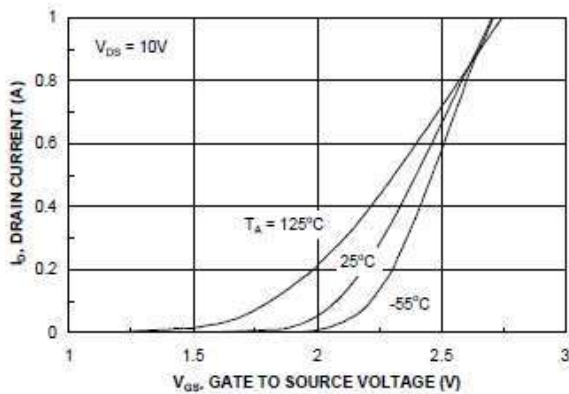
On-Resistance Variation with Drain Current and Gate Voltage



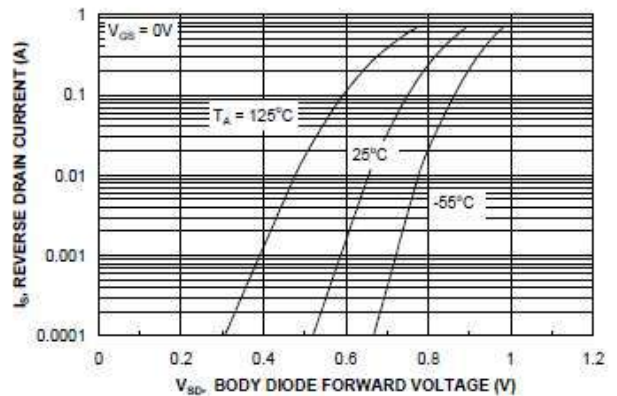
On-Resistance Variation with Temperature



On-Resistance Variation with Gate-to-Source Voltage

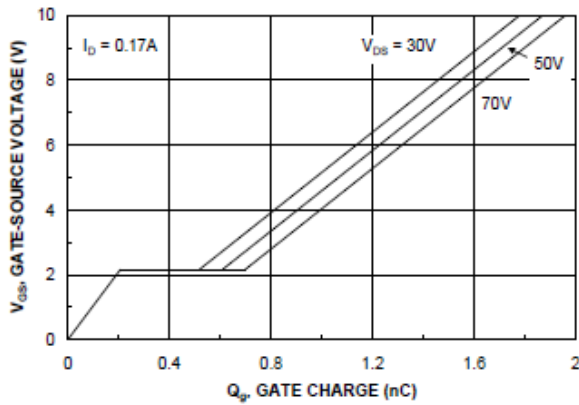


Transfer Characteristics

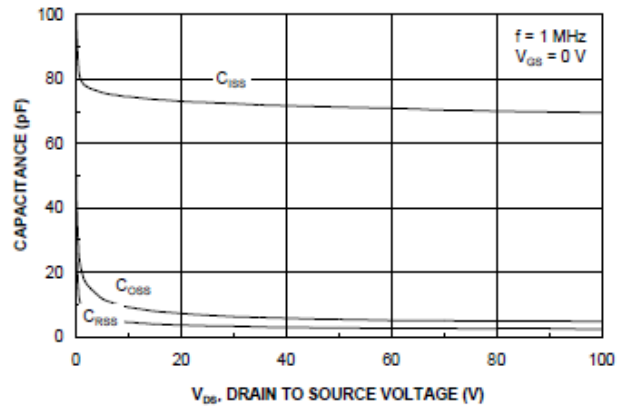


Body Diode Forward Voltage Variation with Source Current and Temperature

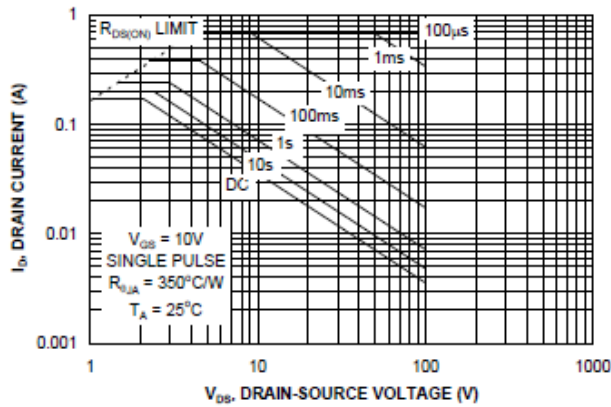
N-Ch 100V Fast Switching MOSFET  
 $V_{DS}=100V, I_D=0.17A, R_{DS(ON)}=5800m\Omega$



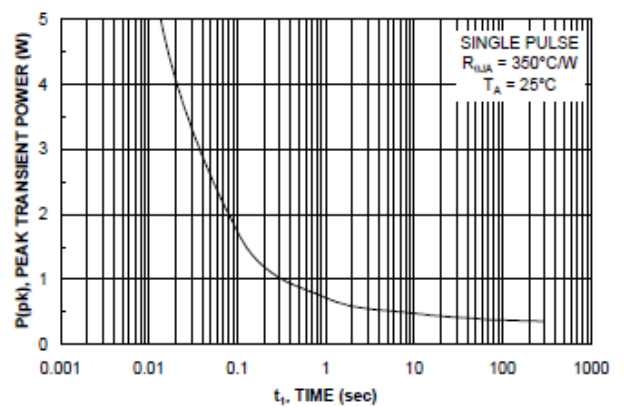
Gate Charge Characteristics



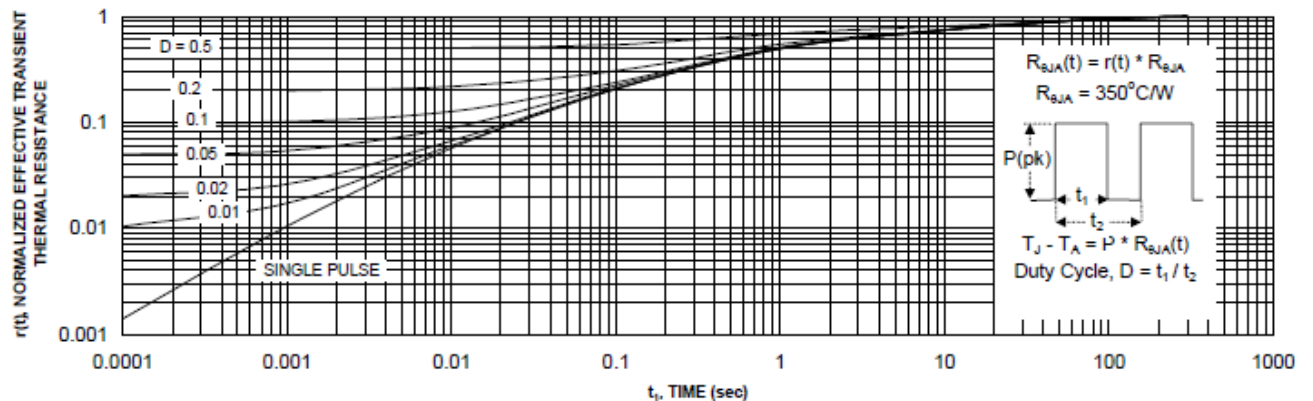
Capacitance Characteristics



Maximum Safe Operating Area

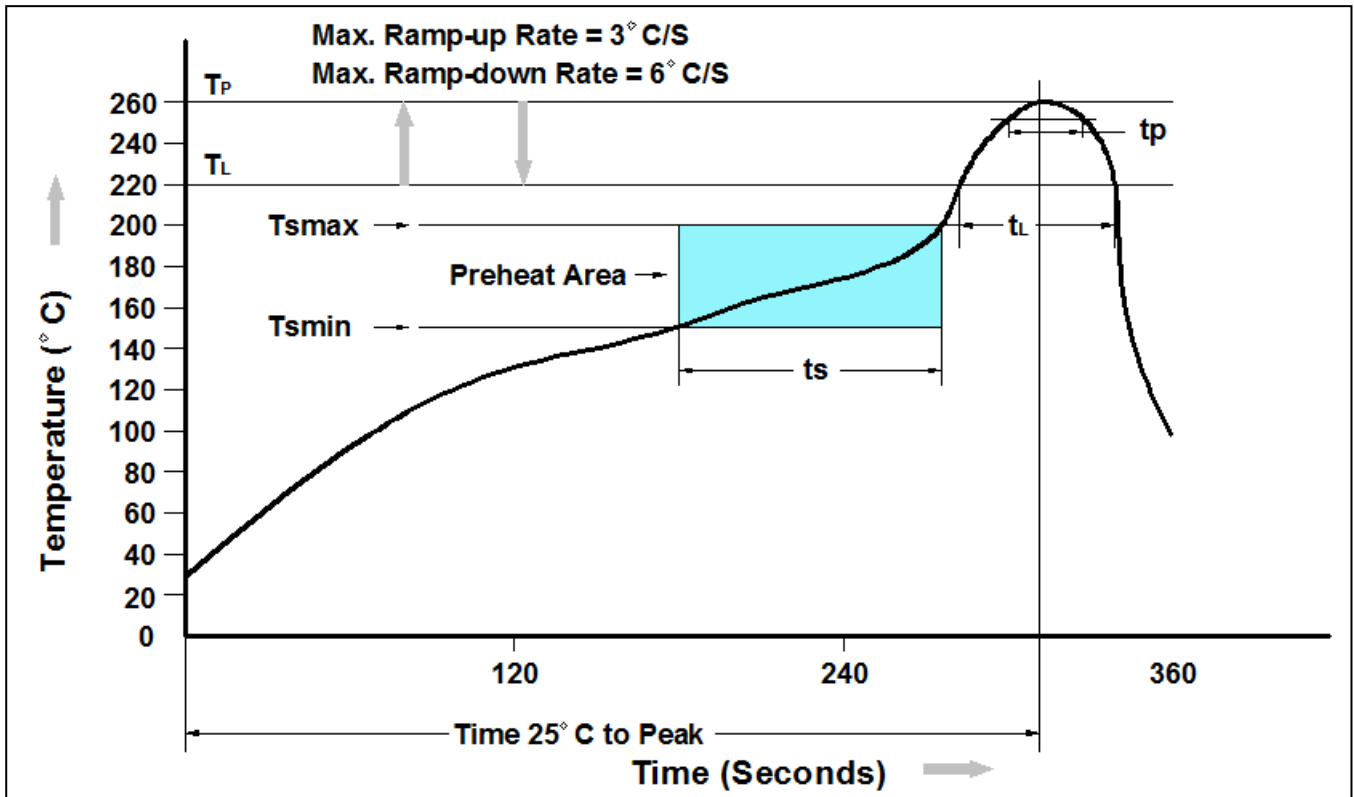


Single Pulse Maximum Power Dissipation



Transient Thermal Response Curve, Junction to Ambient

➤ Recommend IR Reflow Soldering Thermal Profile

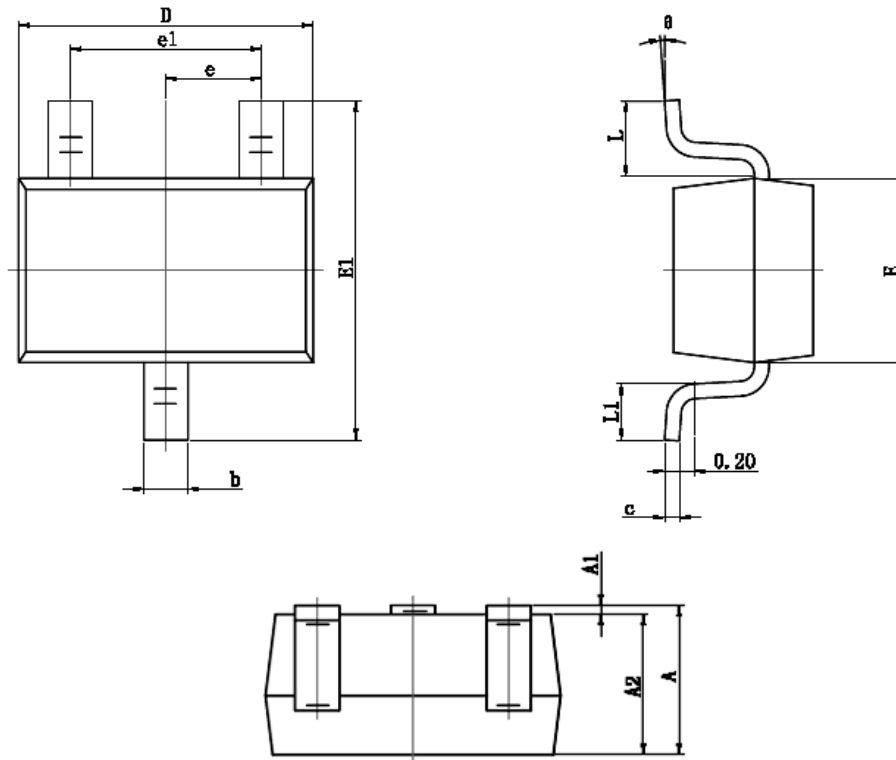


Profile Feature	Pb-Free Assembly Profile
Temperature Min. ( $T_{smin}$ )	150°C
Temperature Max. ( $T_{smax}$ )	200°C
Time ( $t_s$ ) from ( $T_{smin}$ to $T_{smax}$ )	60-120 seconds
Average Ramp-up Rate ( $t_L$ to $t_P$ )	3°C/second max.
Liquidous Temperature ( $T_L$ )	217°C
Time ( $t_L$ ) Maintained 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
PAN1023ER	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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