

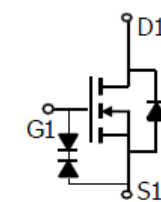
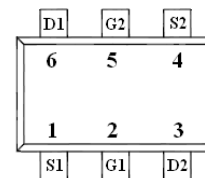
➤ General Description

This PAC2016EL N&P 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.

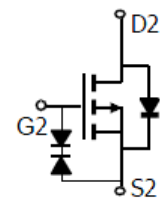
➤ Feature

- Low Offset (Error) Voltage
- Low-Voltage Operation
- High-Speed Circuits
- ESD Protection
- Low Battery Voltage Operation
- SOT-563 package design

➤ SOT-563



n-channel



p-channel

➤ Application

- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories
- Battery Operated Systems
- Power Supply Converter Circuits
- Load/Power Switching Smart Phones, Pagers

N-Ch and P-Ch Fast Switching MOSFET

$V_{DS}=20V, I_D=0.6A, R_{DS(on)}=360m\Omega$

$V_{DS}=-20V, I_D=-0.4A, R_{DS(on)}=620m\Omega$

➤ N-Channel Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	20	V
Gate –Source Voltage	V_{GSS}	± 12	V
Continuous Drain Current($T_J=150^\circ C$)	I_D	$T_A=25^\circ C$	0.6
		$T_A=70^\circ C$	0.4
Pulsed Drain Current	I_{DM}	1.0	A
Continuous Source Current(Diode Conduction)	I_S	0.3	A
Power Dissipation	P_D	$T_A=25^\circ C$	0.27
		$T_A=70^\circ C$	0.16
Operating Junction Temperature	T_J	-55/150	$^\circ C$
Storage Temperature Range	T_{STG}	-55/150	$^\circ C$

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

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Static						
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		1.0	
Gate Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 12V$			± 1	mA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=16V, V_{GS}=0V$			1	uA
		$V_{DS}=16V, V_{GS}=0V$ $T_J=85^\circ C$			5	
On-State Drain Current	$I_{D(on)}$	$V_{DS} \geq 5V, V_{GS}=4.5V$	0.7			A
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=0.6A$		240	360	m Ω
		$V_{GS}=2.5V, I_D=0.5A$		300	420	
		$V_{GS}=1.8V, I_D=0.4A$		420	560	
Forward Transconductance	g_{FS}	$V_{DS}=10V, I_D=0.4A$		1		S
Diode Forward Voltage	V_{SD}	$I_S=0.15A, V_{GS}=0V$		0.8	1.2	V
Dynamic						
Input Capacitance	C_{iss}	$V_{DS}=10V, V_{GS}=0V$ $f=1MHz$		70		pF
Output Capacitance	C_{oss}			20		
Reverse Transfer Capacitance	C_{rss}			8		
Total Gate Charge	Q_g	$V_{DS}=10V, V_{GS}=4.5V$ $I_D \equiv 0.6A$		1.06	1.38	nC
Gate-Source Charge	Q_{gs}			0.18		
Gate-Drain Charge	Q_{gd}			0.32		
Turn-On Time	$t_{d(on)}$	$V_{DD}=10V, R_L=20\Omega$ $I_D \equiv 0.5A, V_{GEN}=4.5V$ $R_G=1\Omega$		18	26	ns
	t_r			20	28	
Turn-Off Time	$t_{d(off)}$			70	110	
	t_f			25	40	

N-Ch and P-Ch Fast Switching MOSFET

$V_{DS}=20V, I_D=0.6A, R_{DS(ON)}=360m\Omega$

$V_{DS}=-20V, I_D=-0.4A, R_{DS(ON)}=620m\Omega$

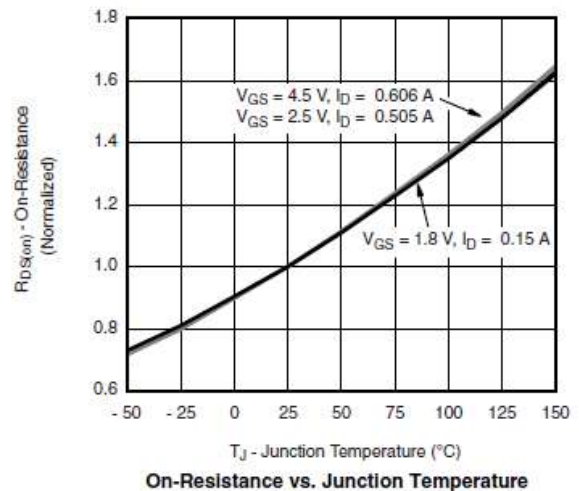
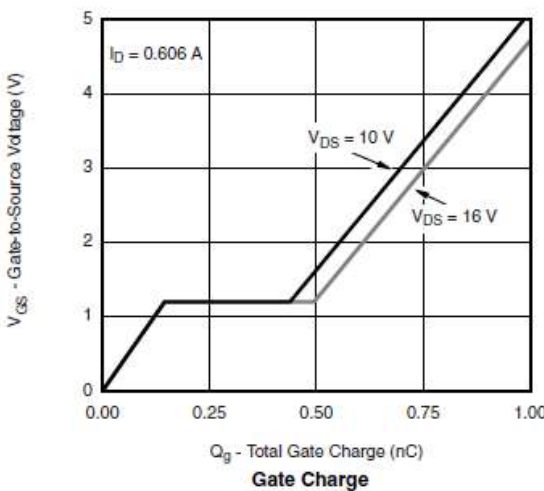
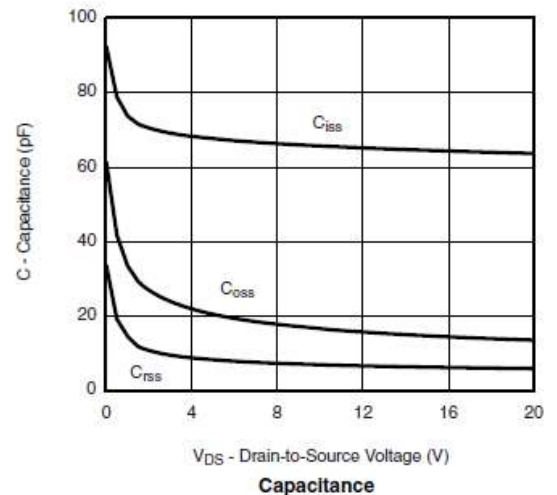
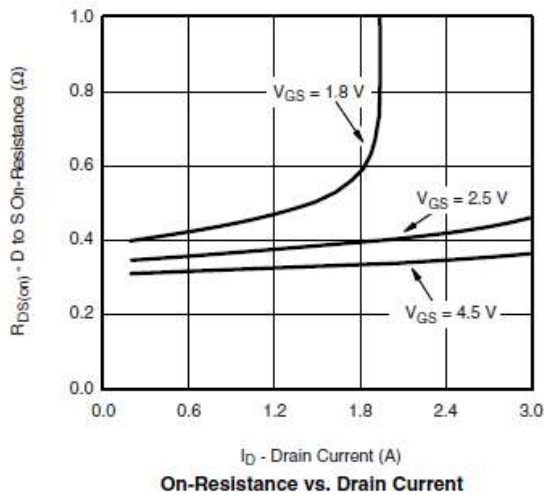
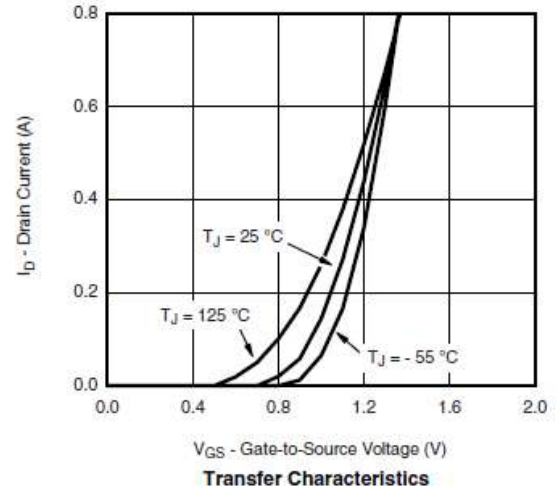
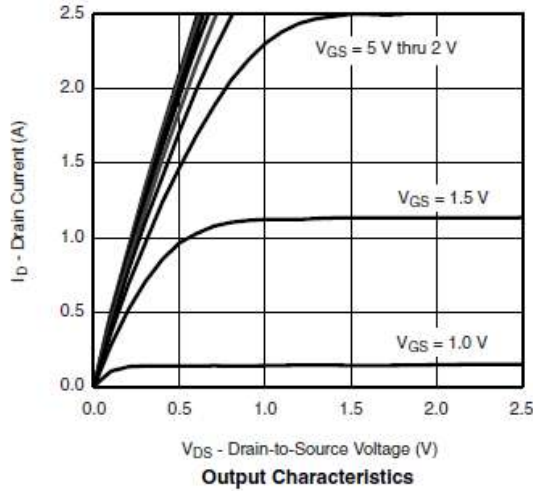
➤ P-Channel Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	-20	V
Gate -Source Voltage	V_{GSS}	± 12	V
Continuous Drain Current($T_J=150^\circ C$)	I_D	$T_A=25^\circ C$	-0.4
		$T_A=70^\circ C$	-0.2
Pulsed Drain Current	I_{DM}	-1.0	A
Continuous Source Current(Diode Conduction)	I_S	-0.3	A
Power Dissipation	P_D	$T_A=25^\circ C$	0.27
		$T_A=70^\circ C$	0.16
Operating Junction Temperature	T_J	-55/150	$^\circ C$
Storage Temperature Range	T_{STG}	-55/150	$^\circ C$

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

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Static						
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		-1.0	
Gate Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 12V$			± 1	mA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-20V, V_{GS}=0V$			-5	uA
		$V_{DS}=-20V, V_{GS}=0V$ $T_J=85^\circ C$			-10	
On-State Drain Current	$I_{D(on)}$	$V_{DS} \geq 5V, V_{GS}=4.5V$	0.7			A
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=-4.5V, I_D=-0.4A$		500	620	m Ω
		$V_{GS}=-2.5V, I_D=-0.3A$		700	860	
		$V_{GS}=-1.8V, I_D=-0.2A$		1000	1450	
Forward Transconductance	g_{FS}	$V_{DS}=-10V, I_D=-0.4A$		1		S
Diode Forward Voltage	V_{SD}	$I_S=-0.15A, V_{GS}=0V$		0.65	1.2	V
Dynamic						
Input Capacitance	C_{iss}	$V_{DS}=-10V, V_{GS}=0V$ $f=1MHz$		70	100	pF
Output Capacitance	C_{oss}			20		
Reverse Transfer Capacitance	C_{rss}			10		
Total Gate Charge	Q_g	$V_{DS}=-10V, V_{GS}=-4.5V$ $I_D=-0.25A$		1.0	1.3	nC
Gate-Source Charge	Q_{gs}			0.1		
Gate-Drain Charge	Q_{gd}			0.3		
Turn-On Time	$t_{d(on)}$	$V_{DD}=-10V, R_L=30\Omega$ $I_D=-0.2A, V_{GEN}=-4.5V$ $R_G=10\Omega$		10	15	ns
	t_r			10	15	
Turn-Off Time	$t_{d(off)}$			40	60	
	t_f			30	50	

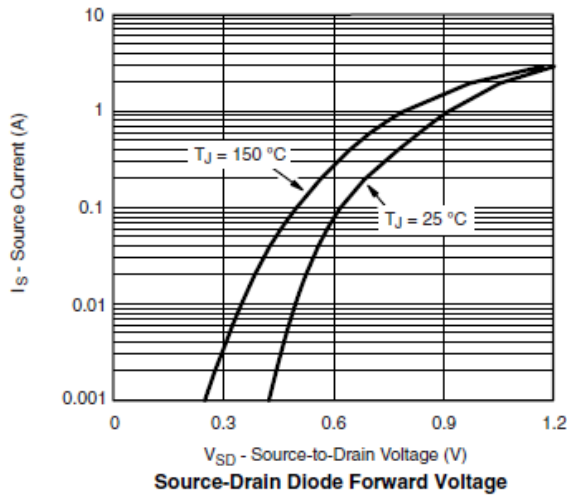
➤ N-Channel Typical Characteristics



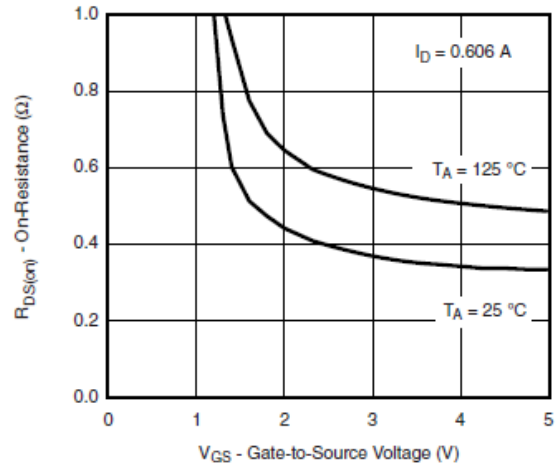
N-Ch and P-Ch Fast Switching MOSFET

$V_{DS}=20V, I_D=0.6A, R_{DS(on)}=360m\Omega$

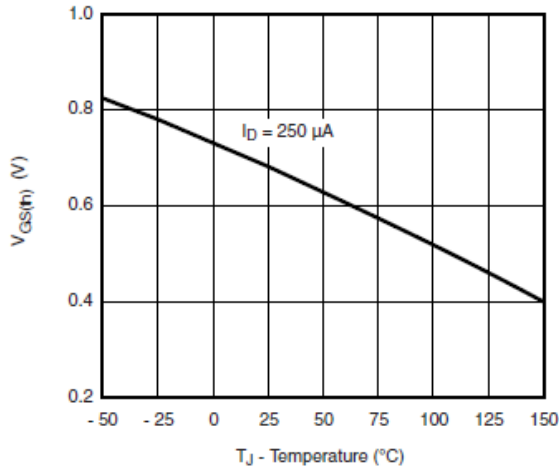
$V_{DS}=-20V, I_D=-0.4A, R_{DS(on)}=620m\Omega$



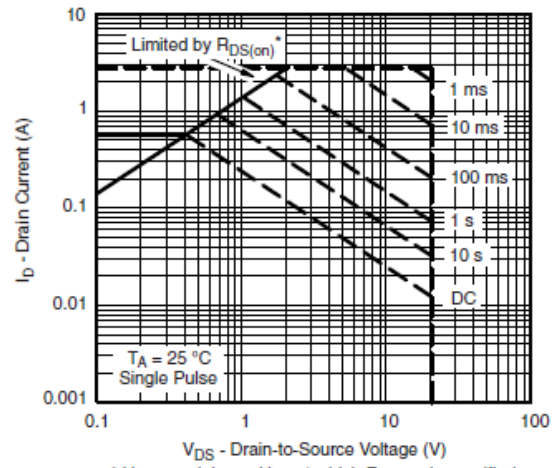
Source-Drain Diode Forward Voltage



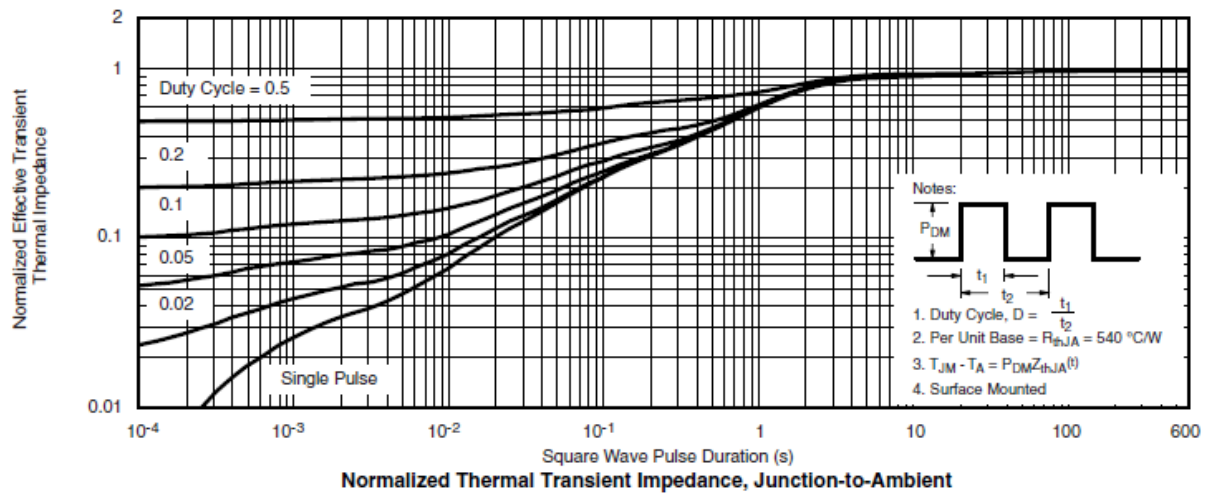
$R_{DS(on)}$ vs. V_{GS} vs Temperature



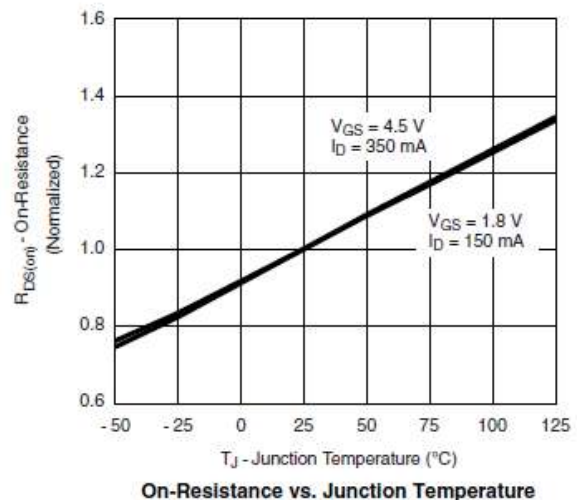
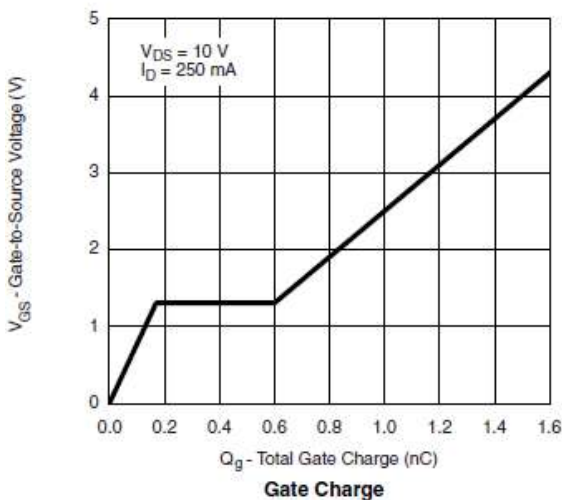
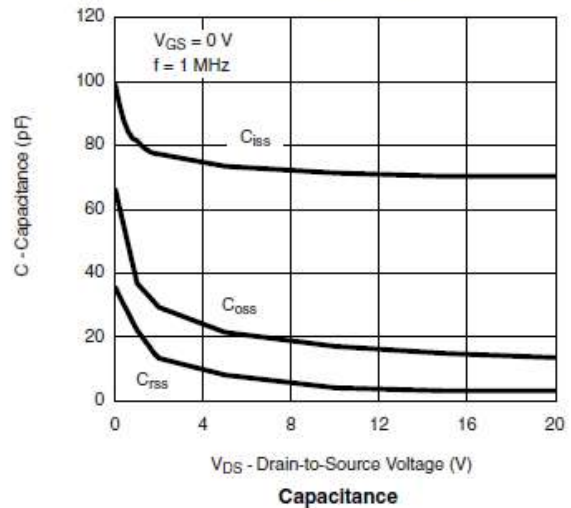
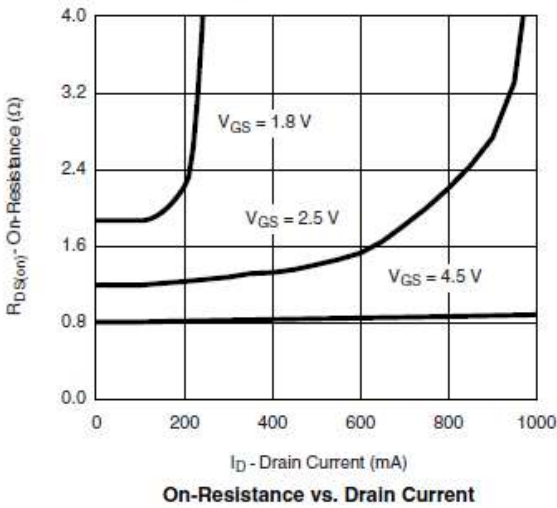
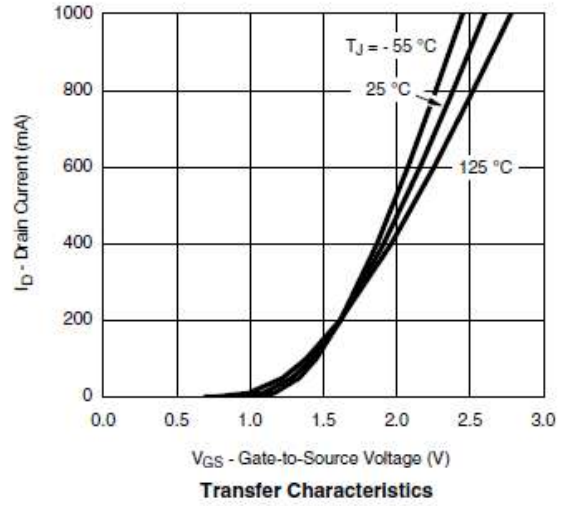
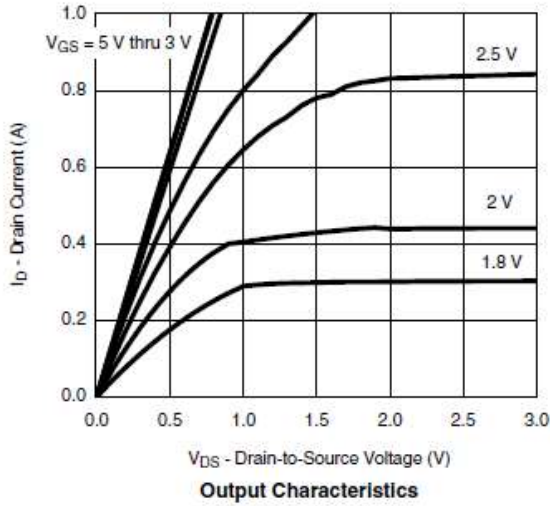
Threshold Voltage



* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified
Safe Operating Area, Junction-to-Ambient



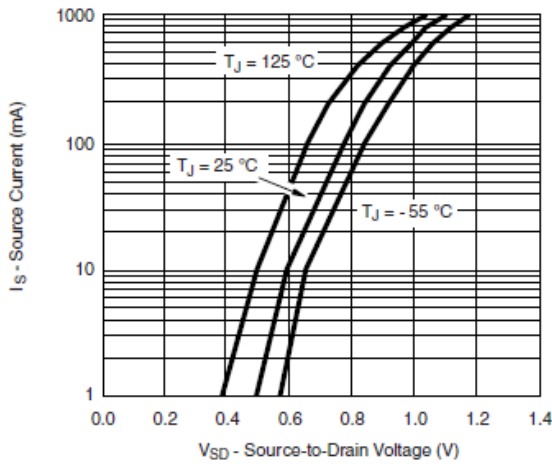
➤ P-Channel Typical Characteristics



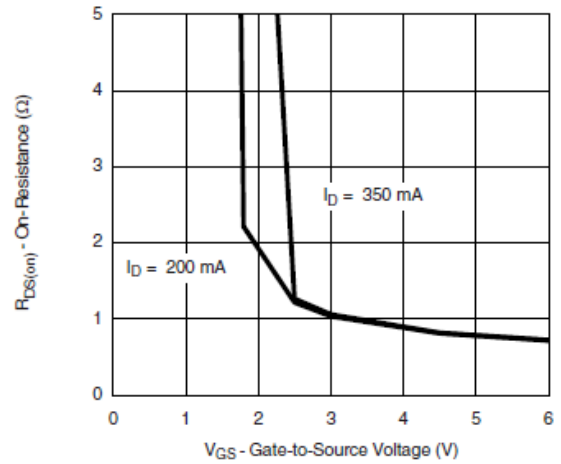
N-Ch and P-Ch Fast Switching MOSFET

$V_{DS}=20V$, $I_D=0.6A$, $R_{DS(on)}=360m\Omega$

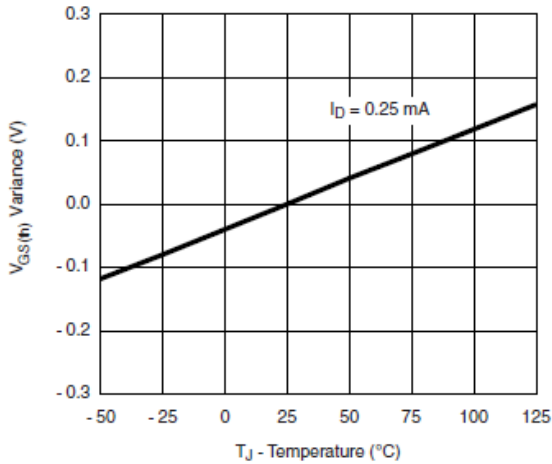
$V_{DS}=-20V$, $I_D=-0.4A$, $R_{DS(on)}=620m\Omega$



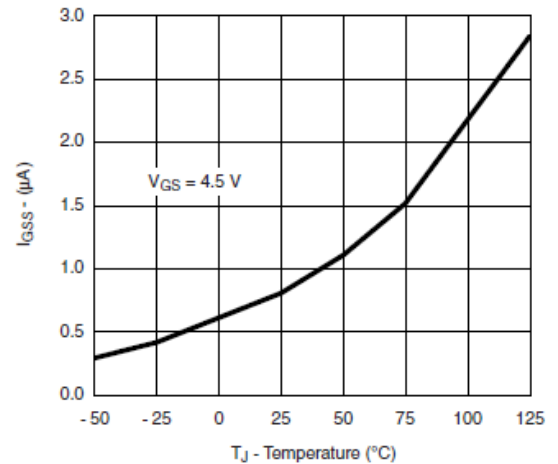
Source-Drain Diode Forward Voltage



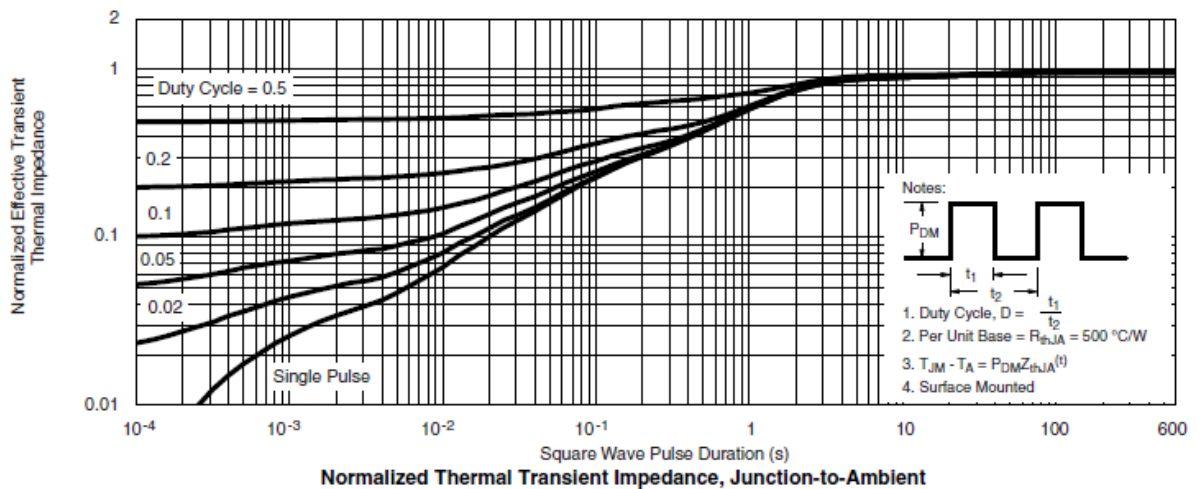
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage Variance vs. Temperature

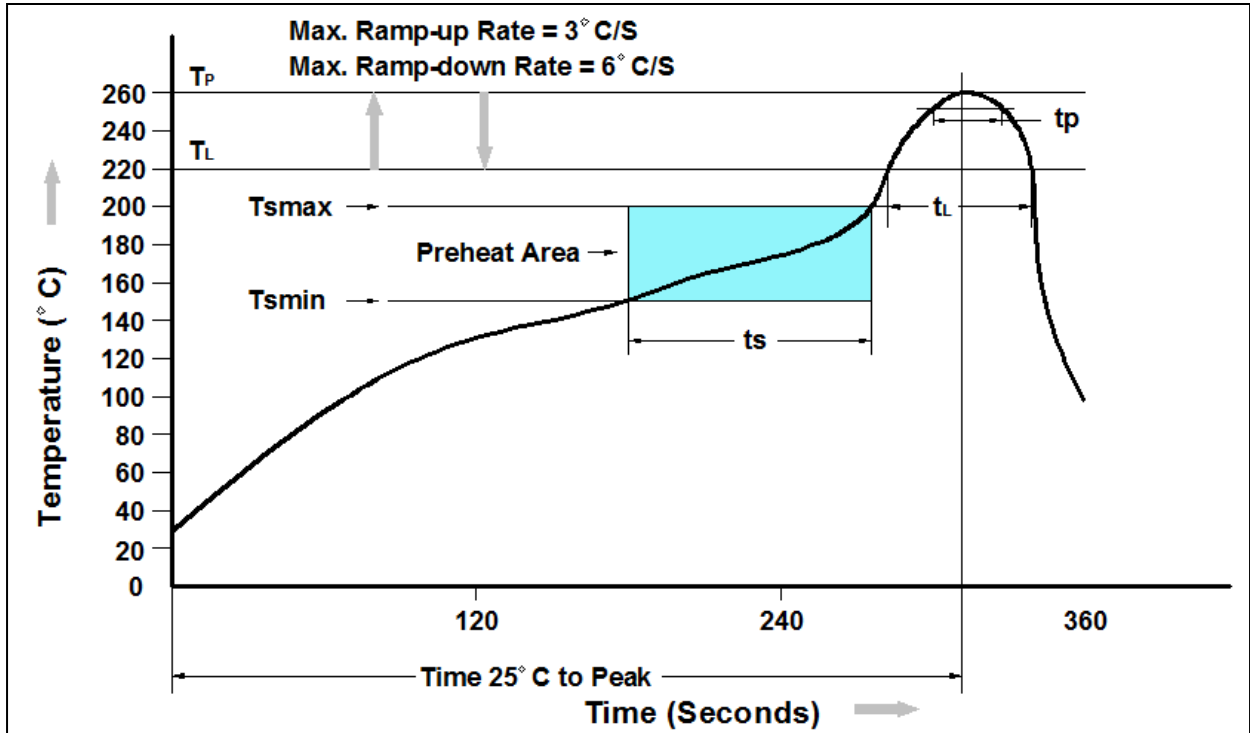


I_{GSS} vs. Temperature



Normalized Thermal Transient Impedance, Junction-to-Ambient

➤ Recommand IR Reflow Soldering Thermal Profile

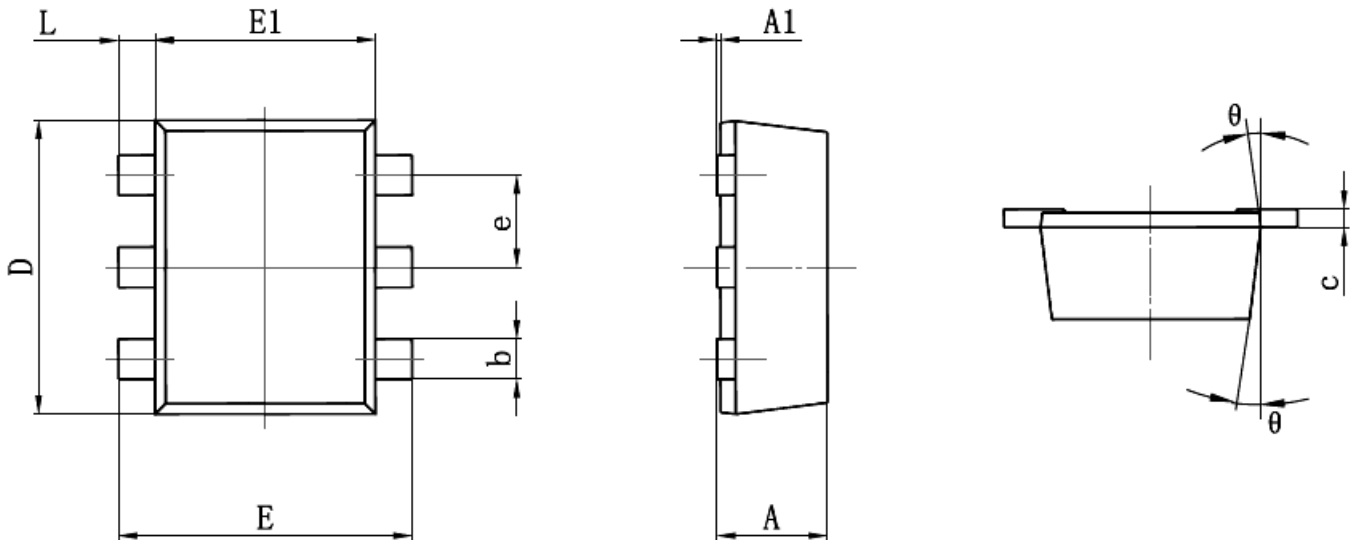


Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T_{smin})	150°C
Temperature Max. (T_{smax})	200°C
Time (t_s) from (T_{smin} to T_{smax})	60-120 seconds
Average Ramp-up Rate (t_L to t_P)	3°C/second max.
Liquidous Temperature (T_L)	217°C
Time (t_L) Maintained Above (T_L)	60 – 150 seconds
Peak 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
PAC2016EL	SOT-563 Reel	3000 pcs

➤ Package Information (SOT-563)



Symbol	Dimenslons In Millimeters		Dimenslons In Inches	
	Min.	Max.	Min.	Max.
A	0.525	0.600	0.021	0.024
A1	0.000	0.050	0.000	0.002
e	0.450	0.550	0.018	0.022
c	0.090	0.160	0.004	0.006
D	1.500	1.700	0.059	0.067
b	0.170	0.270	0.007	0.011
E1	1.100	1.300	0.043	0.051
E	1.500	1.700	0.059	0.067
L	0.100	0.300	0.004	0.012
θ	7 °REF.		7 °REF.	

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