



Power MOSFETS

DATASHEET

LM40160PAO2A

P-Channel
Enhancement Mode MOSFET

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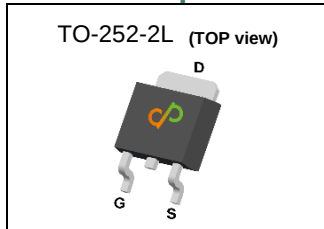


Quality Management Systems

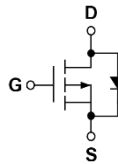
ISO 9001:2015 Certificate

P-Channel Enhancement Mode MOSFET

Pin Description



Symbol



Product Summary

Symbol	P-Channel	Unit
V_{DSS}	-40	V
$R_{DS(ON)-Max}$	16	m Ω
ID	-38	A

Feature

- Reliable and Rugged
- ROHS Compliant & Halogen-Free
- 100% UIS and Tested

Applications

- Load Switches
- BLDC Motor

Ordering Information

Orderable Part Number	Package Type	Form	Shipping	Marking
LM40160PAO2A	TO-252-2L	Tape & Reel	3000 / Tape & Reel	40160 □□□□□□

Note : □□□□□□ = Lot Code

Absolute Maximum Ratings ($T_J=25^{\circ}\text{C}$ Unless Otherwise Noted)

Symbol	Parameter		P-Channel	Unit
V_{DSS}	Drain-Source Voltage		-40	V
V_{GSS}	Gate-Source Voltage		± 20	
T_J	Maximum Junction Temperature		150	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range		-55 to 150	$^{\circ}\text{C}$
$I_{DM}^{①}$	Pulse Drain Current Tested	$T_c=25^{\circ}\text{C}$	-96	A
I_D	Continuous Drain Current	$T_c=25^{\circ}\text{C}$	-38	A
		$T_c=100^{\circ}\text{C}$	-24	
P_D	Maximum Power Dissipation	$T_c=25^{\circ}\text{C}$	37	W
		$T_c=100^{\circ}\text{C}$	15	
$I_{AS}^{②}$	Avalanche Current, Single pulse	$L=0.1\text{mH}$	-28	A
$E_{AS}^{③}$	Avalanche Energy, Single pulse	$L=0.1\text{mH}$	39	mJ

Thermal Characteristics

Symbol	Parameter		Rating	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	3.4	$^{\circ}\text{C/W}$
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient	Steady State	60	$^{\circ}\text{C/W}$

Note ① : Max. current is limited by junction temperature.

Note ② : UIS tested and pulse width are limited by maximum junction temperature 150°C

Note ③ : Surface Mounted on 1in^2 FR-4 board with 1oz.

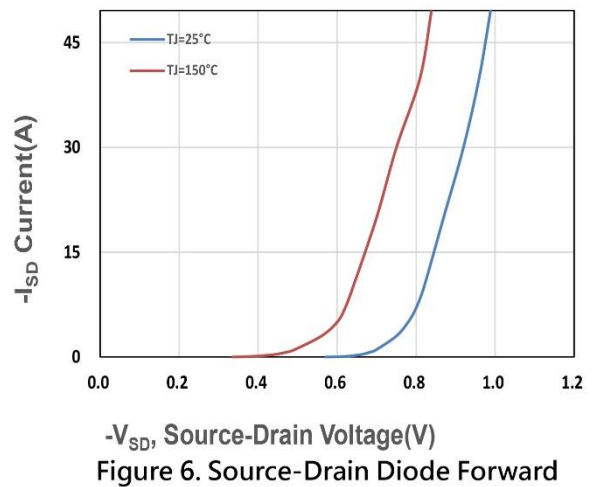
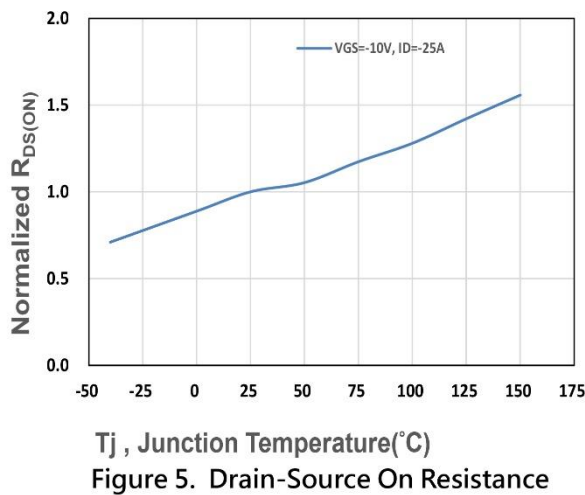
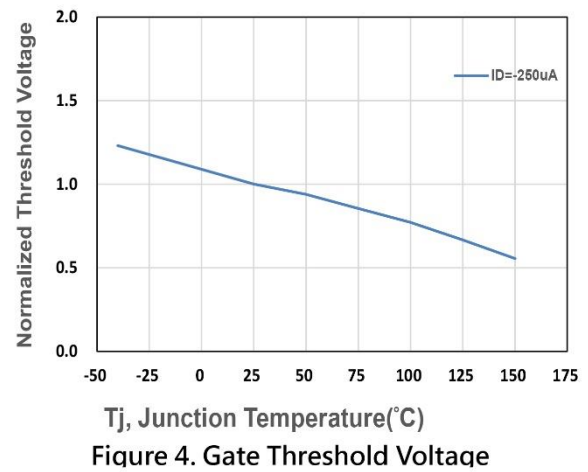
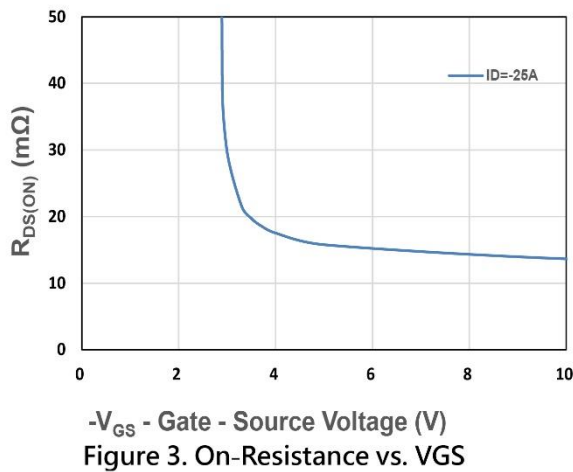
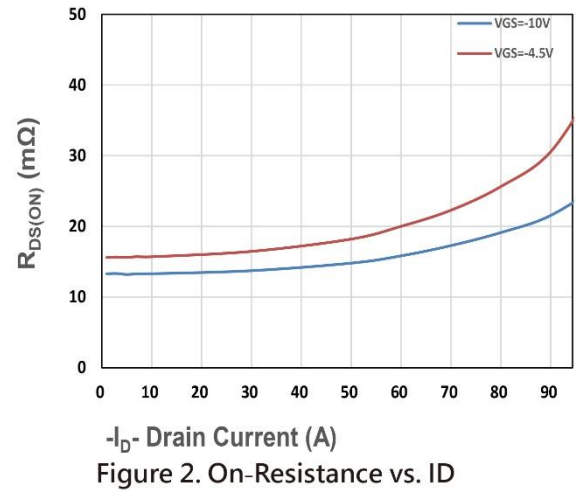
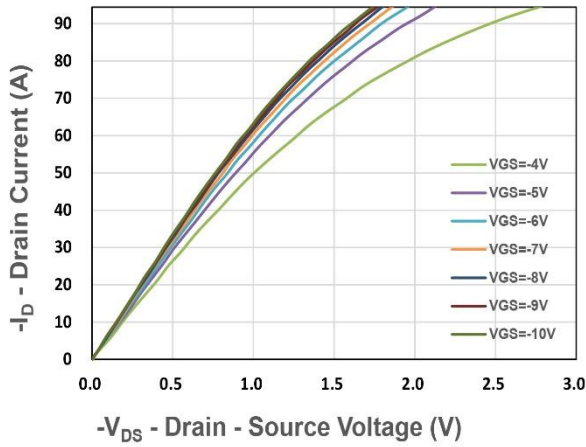
P-Channel Electrical Characteristics ($T_J=25^{\circ}\text{C}$ Unless Otherwise Noted)

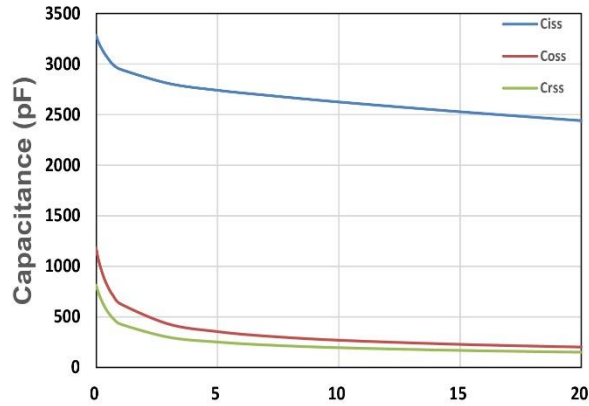
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Electrical Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =-250uA	-40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-32V, V _{GS} =0V	-	-	-1	uA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =-250uA	-1	-1.7	-2.3	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)} ④	Drain-Source On-state Resistance	V _{GS} =-10V, I _{DS} =-25A	-	13.5	16	mΩ
		V _{GS} =-4.5V, I _{DS} =-15A	-	16	20	
gfs	Forward Transconductance	V _{DS} =-5V, I _{DS} =-12.5A	-	2.43	-	S
Dynamic Characteristics ⑥						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, Freq.=1MHz	-	5.5	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-20V, Freq.=1MHz	-	2440	-	pF
C _{oss}	Output Capacitance		-	202	-	
C _{rss}	Reverse Transfer Capacitance		-	150	-	
td(ON)	Turn-on Delay Time	V _{GS} =-10V, V _{DS} =-20V, Id=-1A, RGEN=6Ω	-	6.5	-	nS
tr	Turn-on Rise Time		-	17.9	-	
td(OFF)	Turn-off Delay Time		-	43.7	-	
tf	Turn-off Fall Time		-	52.9	-	
Qg	Total Gate Charge	V _{GS} =-4.5V, V _{DS} =-20V Id=-25A	-	25.4	-	nC
Qg	Total Gate Charge	V _{GS} =-10V, V _{DS} =-20V, Id=-25A	-	53.2	-	
Qgs	Gate-Source Charge		-	10.85	-	
Qgd	Gate-Drain Charge		-	8.63	-	
Source-Drain Characteristics						
VSD④	Diode Forward Voltage	ISD=-12.5A, VGS=0V	-	-0.8	-1.1	V
ttr	Reverse Recovery Time	IF=-12.5A, VR=-20V	-	18.1	-	nS
Qrr	Reverse Recovery Charge	dIF/dt=100A/μs	-	8.9	-	nC

Note ④ : Pulse test (pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$).

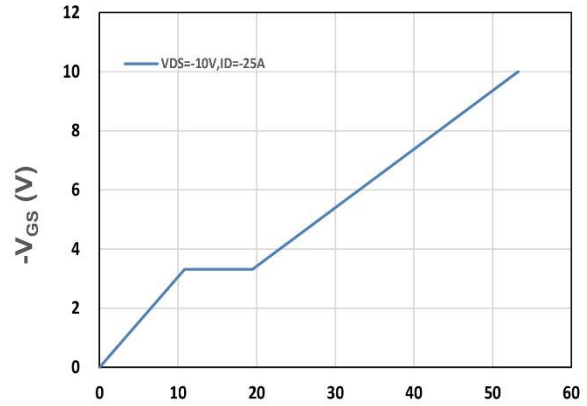
Note ⑤ : Guaranteed by design, not subject to production testing.

P-Channel Typical Characteristics

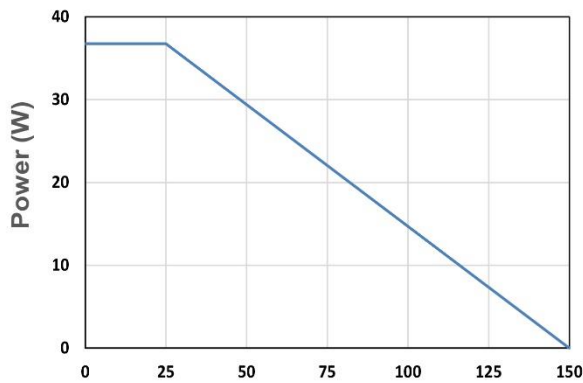




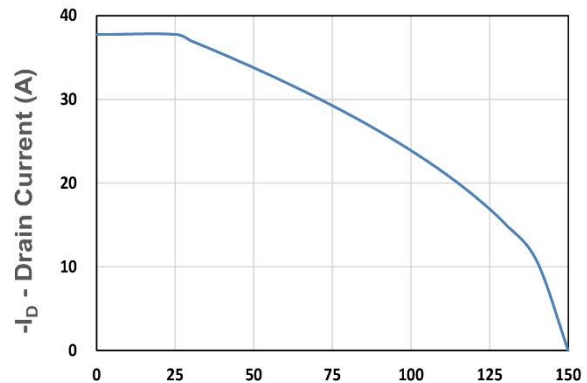
$-V_{DS}$ - Drain - Source Voltage (V)
Figure 7. Capacitance



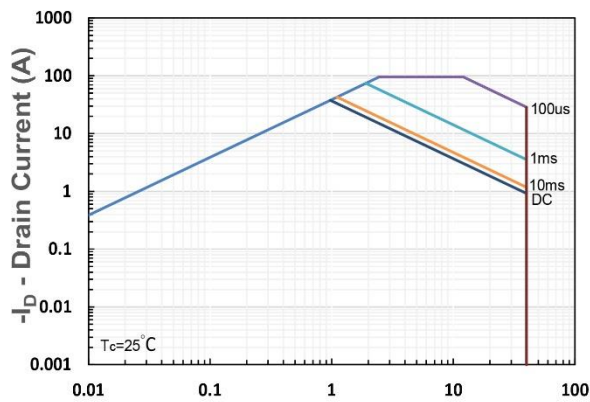
Q_g , Total Gate Charge (nC)
Figure 8. Gate Charge Characteristics



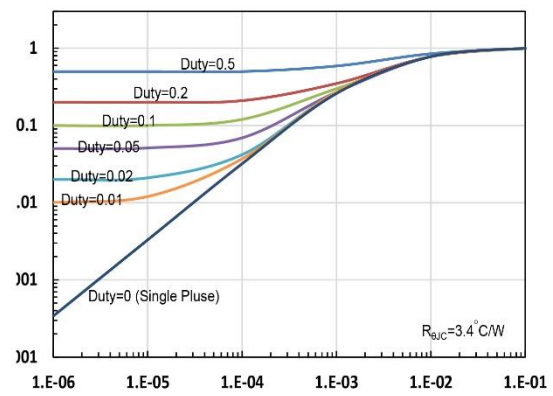
T_c - Case Temperature (°C)
Figure 9. Power Dissipation



T_c - Case Temperature (°C)
Figure 10. Drain Current



$-V_{DS}$ - Drain-Source Voltage (V)
Figure 11. Safe Operating Area



t_1 , Square Wave Pulse Duration(s)
Figure 12. $R_{\theta JC}$ Transient Thermal Impedance