P-Channel 240-V (D-S) MOSFET

PRODUCT SUMMARY			
$V_{(BR)DSS}$ Min (V)	$r_{DS(on)}$ Max (Ω)	$V_{GS(th)}$ (V)	I_D (A)
–240	10 @ V_{GS} = –4.5 V	–0.8 to –2.5	–0.18

FEATURES

- High-Side Switching
- Secondary Breakdown Free: –255 V
- Low On-Resistance: 8 Ω
- Low-Power/Voltage Driven
- Excellent Thermal Stability

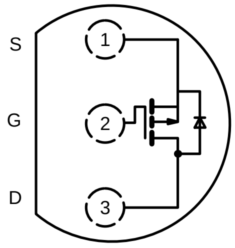
BENEFITS

- Ease in Driving Switches
- Full-Voltage Operation
- Low Offset Voltage
- Easily Driven Without Buffer
- No High-Temperature “Run-Away”

APPLICATIONS

- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Power Supply, Converters
- Motor Control
- Switches

TO-226AA
(TO-92)



Top View

Device Marking
Front View

“S” VP
2410L
xxyy

“S” = Siliconix Logo
xxyy = Date Code

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)

Parameter		Symbol	Limits	Unit
Drain-Source Voltage		V_{DS}	–240	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current (T_J = 150°C)	T_A= 25°C	I_D	–0.18	A
	T_A= 100°C		–0.11	
Pulsed Drain Current[a]		I_{DM}	–0.72	
Power Dissipation	T_A= 25°C	P_D	0.8	W
	T_A= 100°C		0.32	
Thermal Resistance, Junction-to-Ambient		R_{thJA}	156	°C/W
Operating Junction and Storage Temperature Range		T_J, T_{stg}	–55 to 150	°C

Notes
a. Pulse width limited by maximum junction temperature.

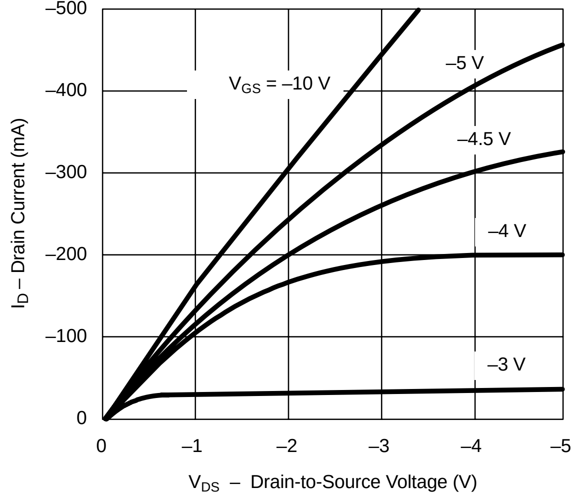
SPECIFICATIONS (T_A = 25°C UNLESS OTHERWISE NOTED)						
Parameter	**Symbol**	**Test Conditions**	**Limits**			**Unit**
			Min	**Typ**[a]	**Max**	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = –5 μA	–240	–255		V
		V_{GS} = 0 V, I_D = –10 μA		–255		
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = –1 mA		–2.1		
		V_{DS} = V_{GS}, I_D = –2.5 mA	–0.8	–2.2	–2.5	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 10	nA
		T_J = 125°C			± 50	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = –180 V, V_{GS} = 0 V			–1	μA
		T_J = 125°C			–100	
On-State Drain Current[b]	$I_{D(on)}$	V_{DS} = –10 V, V_{GS} = –4.5 V	–150	–300		mA
Drain-Source On-Resistance[b]	$r_{DS(on)}$	V_{GS} = –10 V, I_D = –0.1 A		6		Ω
		V_{GS} = –4.5 V, I_D = –0.1 A		8	10	
		T_J = 125°C		14.5	20	
Forward Transconductance[b]	g_{fs}	V_{DS} = –10 V, I_D = –0.1 A	125	175		mS
Common Source Output Conductance[b]	g_{os}	V_{DS} = –10 V, I_D = –0.05 A		0.125		
Dynamic						
Input Capacitance	C_{iss}	V_{DS} =–25 V, V_{GS} = 0 V f = 1 MHz		65	95	pF
Output Capacitance	C_{oss}			25	30	
Reverse Transfer Capacitance	C_{rss}			12	15	
Switching[c]						
Turn-On Time	$t_{d(on)}$	V_{DD} = –25 V, R_L = 250 Ω I_D ≅ –0.1 A, V_{GEN} = –10 V R_G = 25 Ω		7	15	ns
	t_r			18	30	
Turn-Off Time	$t_{d(off)}$			45	70	
	t_f			45	60	

Notes
a. For DESIGN AID ONLY, not subject to production testing.
b. Pulse test: PW ≤ 300 μs duty cycle ≤ 2%.
c. Switching time is essentially independent of operating temperature.

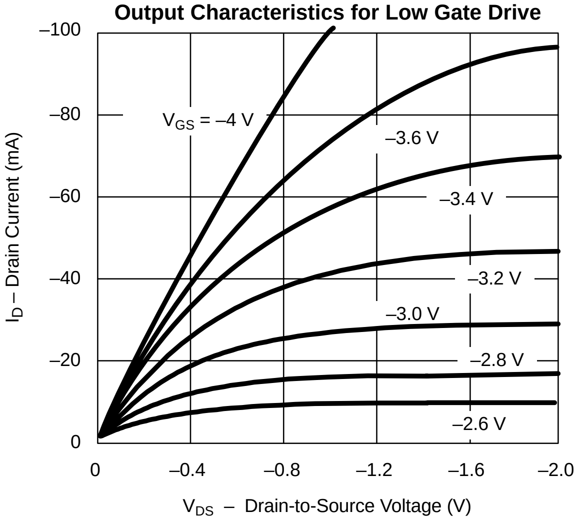
VPDV24

TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)

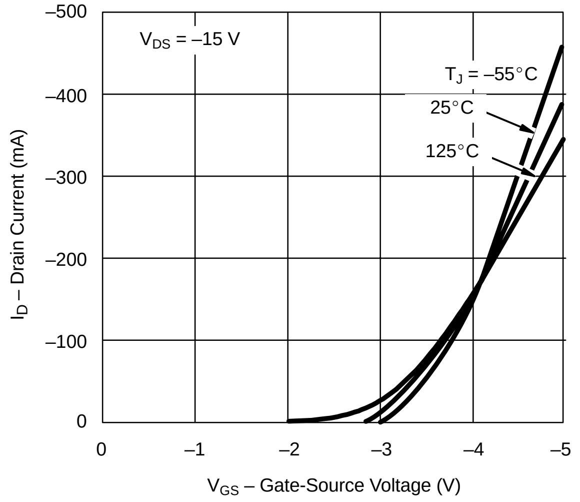
Ohmic Region Characteristics



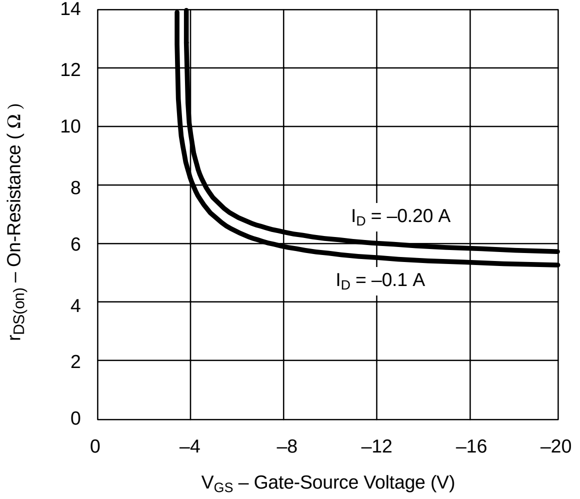
Output Characteristics for Low Gate Drive



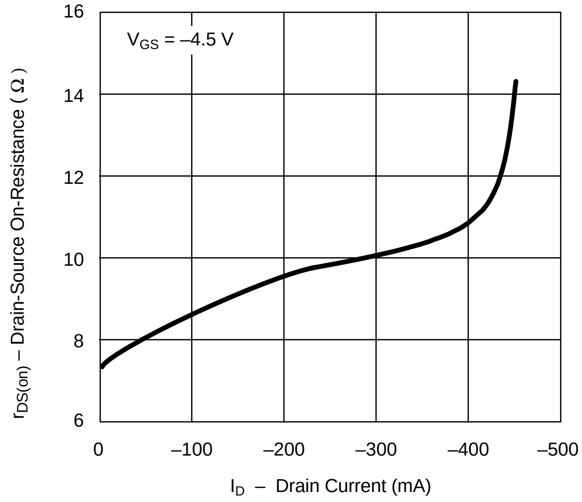
Transfer Characteristics



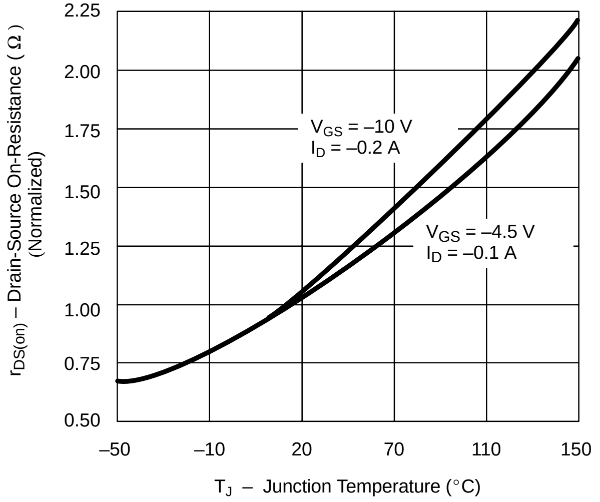
On-Resistance vs. Gate-to-Source Voltage



On-Resistance vs. Drain Current

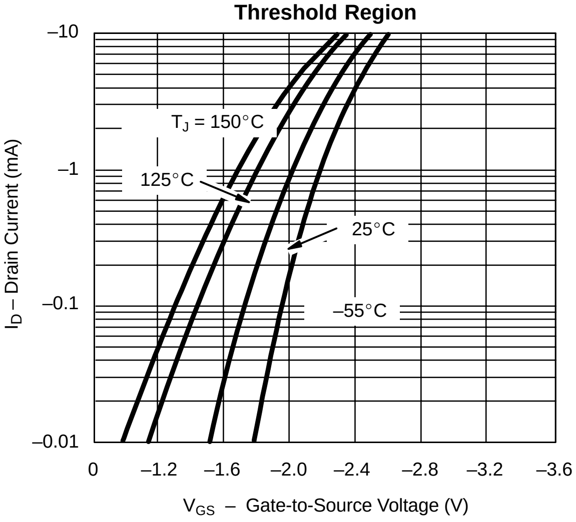


Normalized On-Resistance vs. Junction Temperature

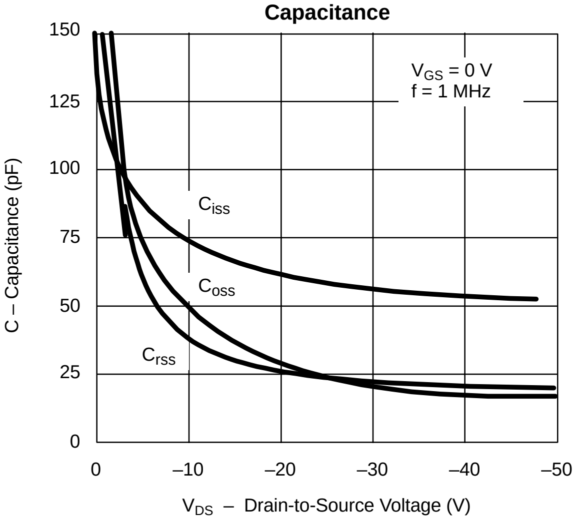


TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)

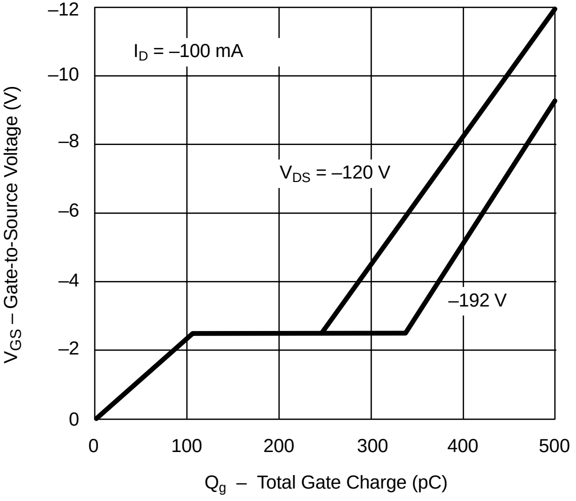
Threshold Region



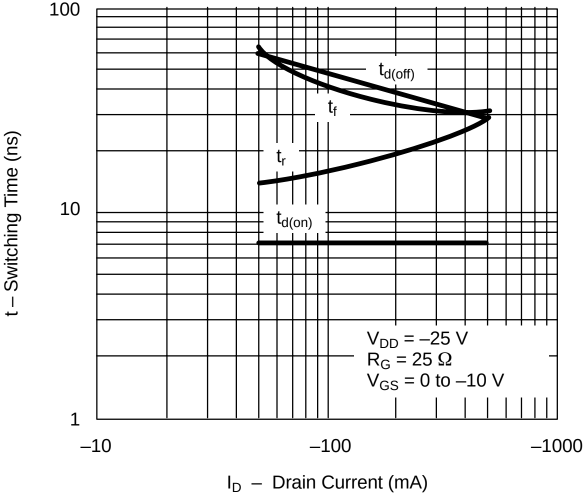
Capacitance



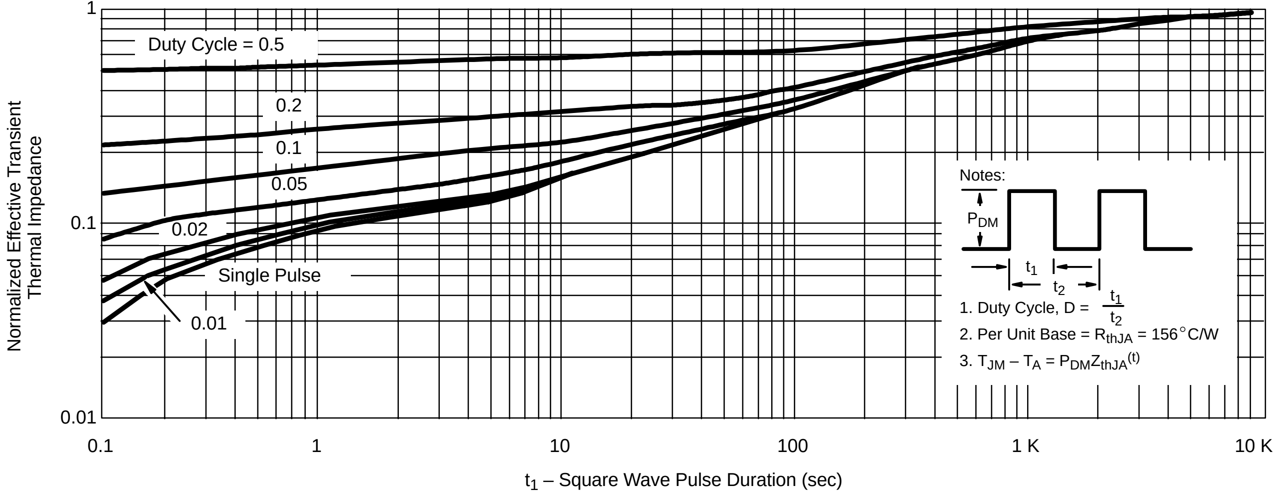
Gate Charge



Load Condition Effects on Switching



Normalized Effective Transient Thermal Impedance, Junction-to-Ambient (TO-226AA)



1. Duty Cycle, D = $\frac{t_1}{t_2}$
2. Per Unit Base = R_{thJA} = 156°C/W
3. $T_{JM} – T_A = P_{DM}Z_{thJA}^{(t)}$