P-Channel Enhancement-Mode MOSFET Transistors

PRODUCT SUMMARY

Part Number	$V_{(BR)DSS}$ Min (V)	$r_{DS(on)}$ Max (Ω)	$V_{GS(th)}$ (V)	I_D (A)
VP0300B	–30	2.5 @ V_{GS} = –12 V	–2 to –4.5	–1.25
VP0300L		2.5 @ V_{GS} = –12 V	–2 to –4.5	–0.32
VP0300LS		2.5 @ V_{GS} = –12 V	–2 to –4.5	–0.5
VQ2001J		2 @ V_{GS} = –12 V	–2 to –4.5	–0.6
VQ2001P		2 @ V_{GS} = –12 V	–2 to –4.5	–0.6

FEATURES

- High-Side Switching
- Low On-Resistance: 1.5 Ω
- Moderate Threshold: –3.1 V
- Fast Switching Speed: 17 ns
- Low Input Capacitance: 60 pF

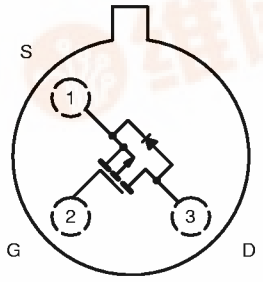
BENEFITS

- Ease in Driving Switches
- Low Offset (Error) Voltage
- Low-Voltage Operation
- High-Speed Switching
- Easily Driven Without Buffer

APPLICATIONS

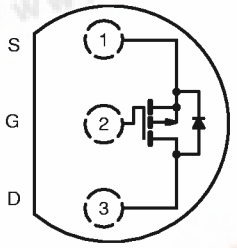
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems
- Power Supply, Converter Circuits
- Motor Control

TO-205AD (TO-39)
(Case Drain)



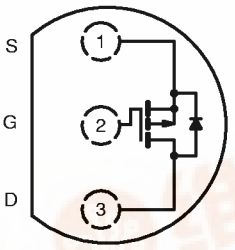
Top View
VP0300B

TO-226AA
(TO-92)



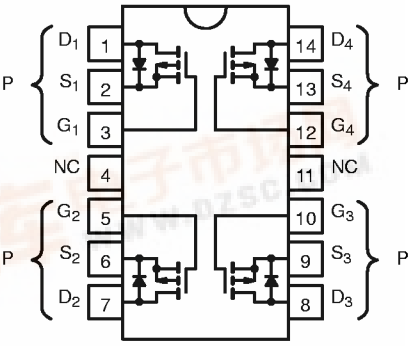
Top View
VP0300L

TO-92S



Top View
VP0300LS

Dual-In-Line



Top View
Plastic: VQ2001J
Sidebraze: VQ2001P

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

Parameter		Symbol	VP0300B	VP0300L	VP0300LS	VQ2001J/P Single	VQ2001J/P Total Quad	Unit
Drain-Source Voltage		V_{DS}	–30	–30	–30	–30	–30	V
Gate-Source Voltage		V_{GS}	±20	±20	±20	±20	±20	V
Continuous Drain Current (T_J = 150°C)	T_A= 25°C	I_D	–1.25[b]	–0.32	–0.5	–0.6	–0.6	A
	T_A= 100°C		–0.79[b]	–0.2	–0.32	–0.37	–0.37	
Pulsed Drain Current[a]		I_{DM}	–3	–2.4	–3	–2	–2	
Power Dissipation	T_A= 25°C	P_D	6.25[b]	0.8	0.9	1.3	2	W
	T_A= 100°C		2.5[b]	0.32	0.4	0.52	0.8	
Maximum Junction-to-Ambient		R_{thJA}	20[b]	156	139	96	62.5	°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.
b. Power dissipation and continuous drain current at T_C = 25°C; R_{thJC} = 20°C/W.
c. Applications information may also be obtained via FaxBack, request document #70611.

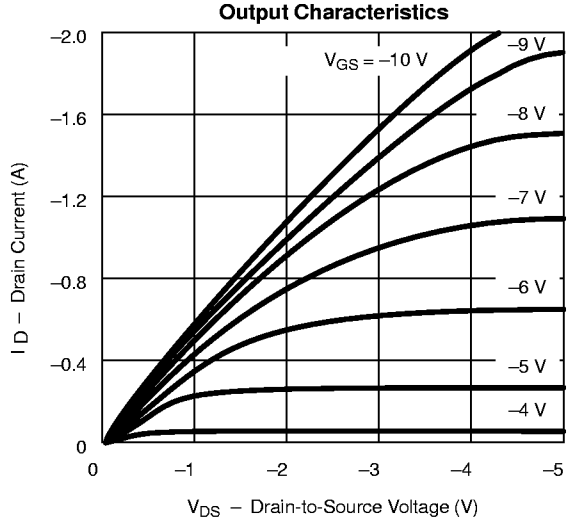
SPECIFICATIONS (T_A = 25°C UNLESS OTHERWISE NOTED)								
				Limits				
				VP0300B/L/LS		VQ2001J/P		
Parameter	Symbol	Test Conditions	Typ[a]	Min	Max	Min	Max	Unit
Static								
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = –10 µA	–55	–30		–30		V
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = –1 mA	–3.1	–2	–4.5	–2	–4.5	V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±16 V					±100	nA
		T_J = 125°C					±500	nA
		V_{DS} = 0 V, V_{GS} = ±20 V			±100			nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = –24 V, V_{GS} = 0 V			–10			µA
		T_J = 125°C			–500		–500	µA
		V_{DS} = –30 V, V_{GS} = 0 V					–10	µA
On-State Drain Current[b]	$I_{D(on)}$	V_{DS} = –10 V, V_{GS} = –12 V	–2.8	–1.5		–1.5		A
Drain-Source On-Resistance[b]	$r_{DS(on)}$	V_{GS} = –12 V, I_D = –1 A	1.5		2.5		2	Ω
		T_J = 125°C	2.6		3.6		3.6	Ω
Forward Transconductance[b]	g_{fs}	V_{DS} = –10 V, I_D = –0.5 A	370	200		200		mS
Common Source Output Conductance[b]	g_{os}	V_{DS} = –7.5 V, I_D = –0.05 A	0.25					mS
Dynamic								
Input Capacitance	C_{iss}	V_{DS} = –15 V, V_{GS} = 0 V f = 1 MHz	60		150		150	pF
Output Capacitance	C_{oss}		40		100		100	pF
Reverse Transfer Capacitance	C_{rss}		10		60		60	pF
Switching[c]								
Turn-On Time	t_{ON}	V_{DD} = –25 V, R_L = 23 Ω I_D ≅ –1 A, V_{GEN} = –10 V R_G = 25 Ω	19		30			ns
Turn-Off Time	t_{OFF}		17		30			ns
Turn-On Time	t_{ON}	V_{DD} =–15 V, R_L = 23 Ω I_D ≅ –0.6 A, V_{GEN} = –10 V R_G = 25 Ω	19				30	ns
Turn-Off Time	t_{OFF}		16				30	ns

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.

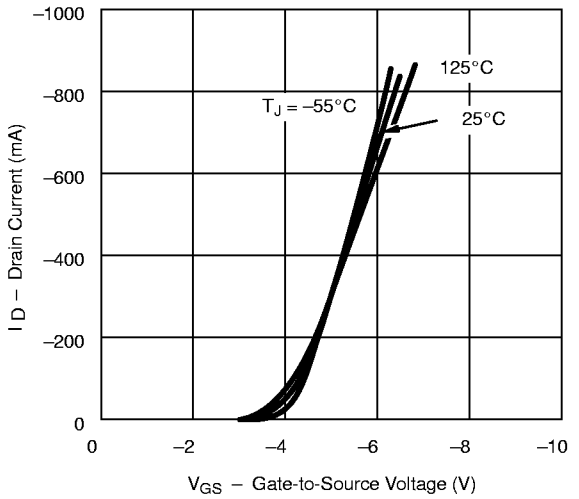
VPEA03

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

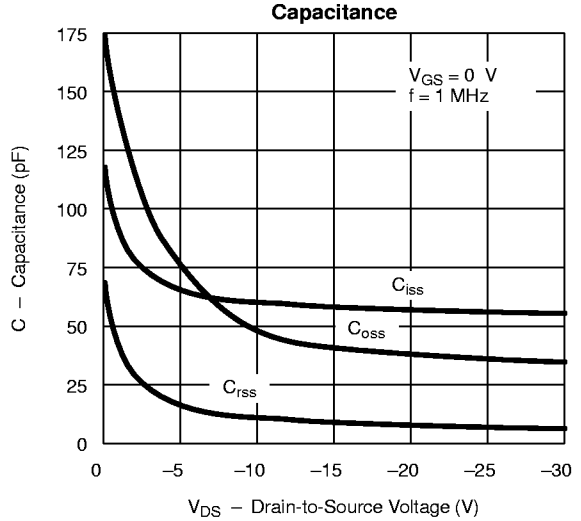
Output Characteristics



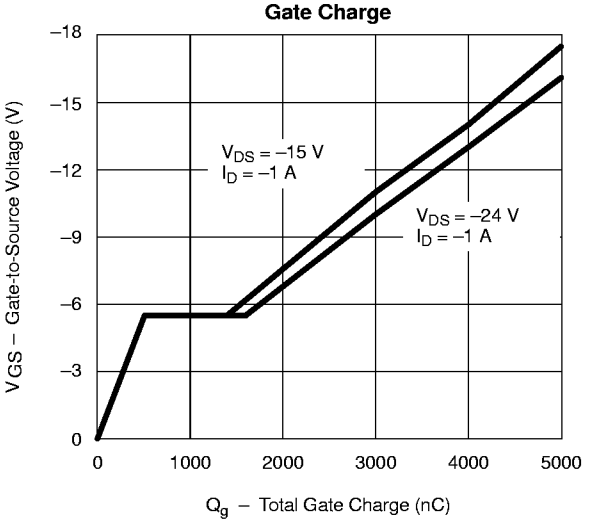
Transfer Characteristics



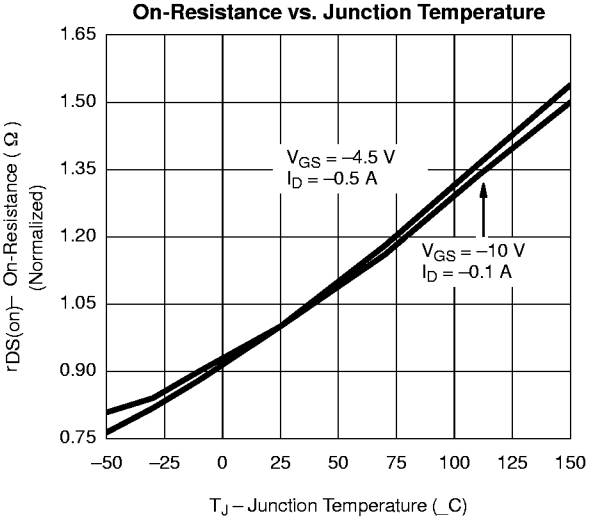
Capacitance



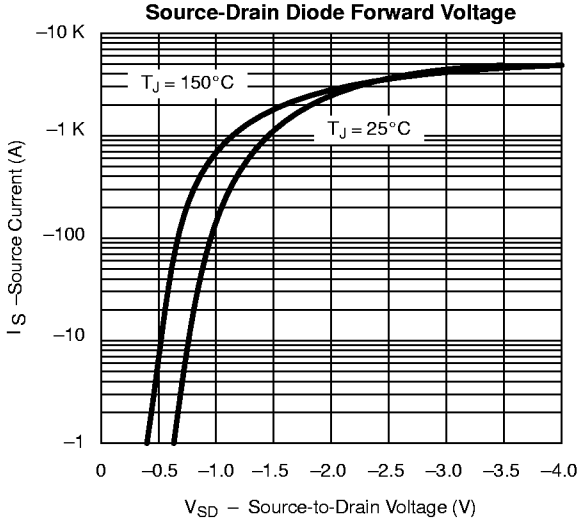
Gate Charge



On-Resistance vs. Junction Temperature

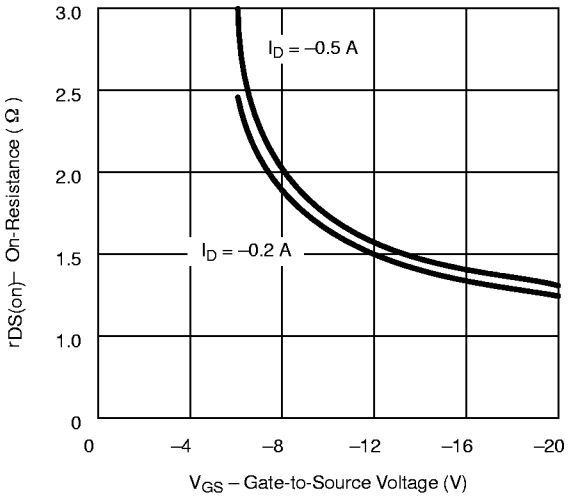


Source-Drain Diode Forward Voltage

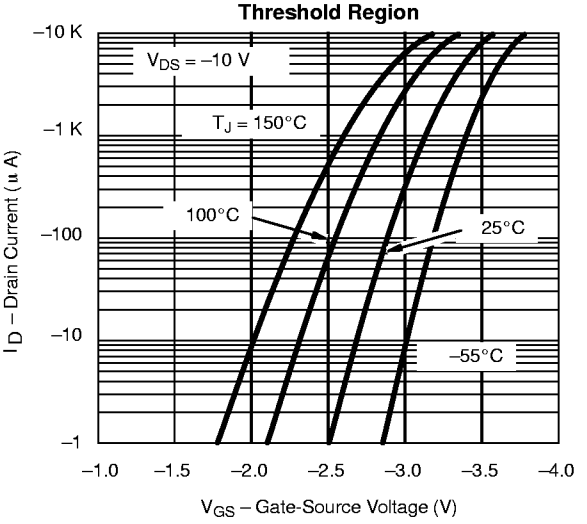


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

On-Resistance vs. Gate-to-Source Voltage

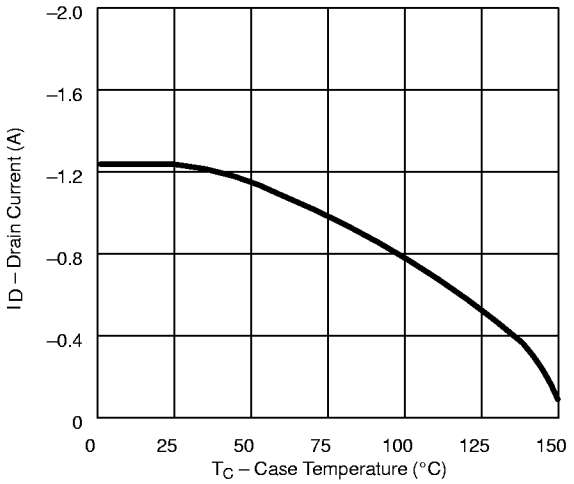


Threshold Region

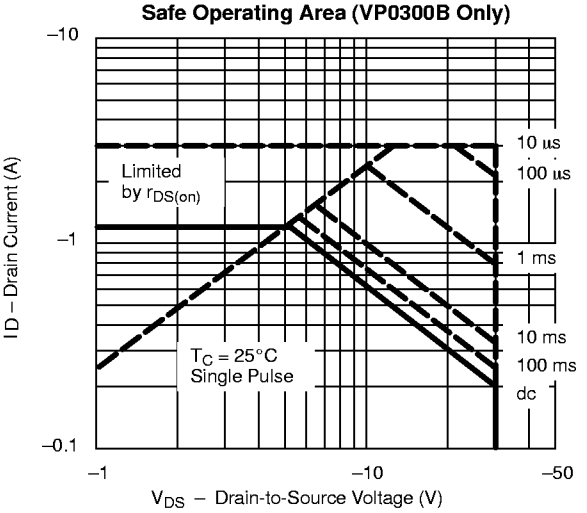


THERMAL RATINGS

Maximum Drain Current vs. Case Temperature (VP0300B Only)



Safe Operating Area (VP0300B Only)



Normalized Effective Transient Thermal Impedance, Junction-to-Ambient (TO-226AA, VP0300L Only)