



N-Channel 60-V (D-S) Single and Quad MOSFETs

PRODUCT SUMMARY				
Part Number	$V_{(BR)DSS}$ Min (V)	$r_{DS(on)}$ Max (Ω)	$V_{GS(th)}$ (V)	I_D (A)
2N6660	60	3 @ $V_{GS} = 10$ V	0.8 to 2	1.1
VQ1004J/P		3.5 @ $V_{GS} = 10$ V	0.8 to 2.5	0.46

FEATURES

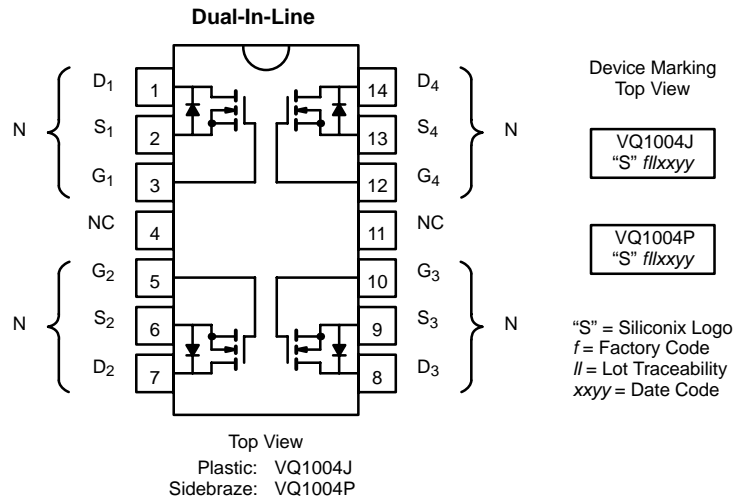
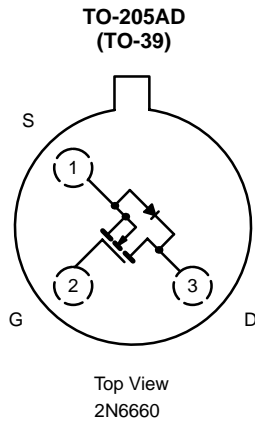
- Low On-Resistance: 1.3 Ω
- Low Threshold: 1.7 V
- Low Input Capacitance: 35 pF
- Fast Switching Speed: 8 ns
- Low Input and Output Leakage

BENEFITS

- Low Offset Voltage
- Low-Voltage Operation
- Easily Driven Without Buffer
- High-Speed Circuits
- Low Error Voltage

APPLICATIONS

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



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)							
Parameter	Symbol	2N6660	Single		Total Quad	Unit	
			VQ1004J	VQ1004P	VQ1004J/P		
Drain-Source Voltage	V_{DS}	60	60	60		V	
Gate-Source Voltage	V_{GS}	± 20	± 30	± 20			
Continuous Drain Current ($T_J = 150^\circ\text{C}$)	I_D	$T_C = 25^\circ\text{C}$	1.1	0.46	± 0.46	A	
		$T_C = 100^\circ\text{C}$	0.8	0.26	0.26		
Pulsed Drain Current ^a	I_{DM}	3	2	2			
Power Dissipation	P_D	$T_C = 25^\circ\text{C}$	6.25	1.3	1.3	2	W
		$T_C = 100^\circ\text{C}$	2.5	0.52	0.52	0.8	
Thermal Resistance, Junction-to-Ambient ^b	R_{thJA}	170	0.96	0.96	62.5	$^\circ\text{C}/\text{W}$	
Thermal Resistance, Junction-to-Case	R_{thJC}	20					
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 150					$^\circ\text{C}$

Notes

- a. Pulse width limited by maximum junction temperature.
 b. This parameter not registered with JEDEC.



SPECIFICATIONS (T _A = 25 °C UNLESS OTHERWISE NOTED)								
Parameter	Symbol	Test Conditions	Typ ^a	Limits				Unit
				2N6660		VQ1004J/P		
				Min	Max	Min	Max	
Static								
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 10 μA	75	60		60		V
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 1 mA	1.7	0.8	2	0.8	2.5	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±15 V			±100		±100	nA
		T _C = 125 °C			±500		±500	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 60 V, V _{GS} = 0 V			10			μA
		V _{DS} = 35 V, V _{GS} = 0 V						
		V _{DS} = 48 V, V _{GS} = 0 V					1	
		T _C = 125 °C			500		500	
On-State Drain Current ^b	I _{D(on)}	V _{DS} = 10 V, V _{GS} = 10 V	3	1.5		1.5		A
Drain-Source On-Resistance ^b	r _{DS(on)}	V _{GS} = 5 V, I _D = 0.3 A ^d	2		5		5	Ω
		V _{GS} = 10 V, I _D = 1 A	1.3		3		3.5	
		T _C = 125 °C ^d	2.4		4.2		4.9	
Forward Transconductance ^b	g _{fs}	V _{DS} = 10 V, I _D = 0.5 A	350	170		170		mS
Common Source Output Conductance ^b	g _{os}	V _{DS} = 10 V, I _D = 0.1 A	1					
Diode Forward Voltage	V _{SD}	I _S = 0.99 A, V _{GS} = 0 V	0.8					V
Dynamic								
Input Capacitance	C _{iss}	V _{DS} = 24 V, V _{GS} = 0 V f = 1 MHz	35		50		60	pF
Output Capacitance	C _{oss}		25		40		50	
Reverse Transfer Capacitance	C _{rss}		7		10		10	
Drain-Source Capacitance	C _{ds}		30		40			
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	8		10		10	ns
Turn-Off Time	t _{OFF}		8.5		10		10	

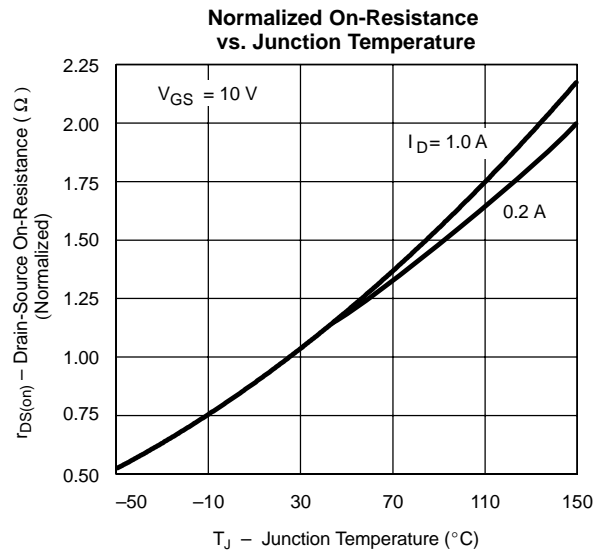
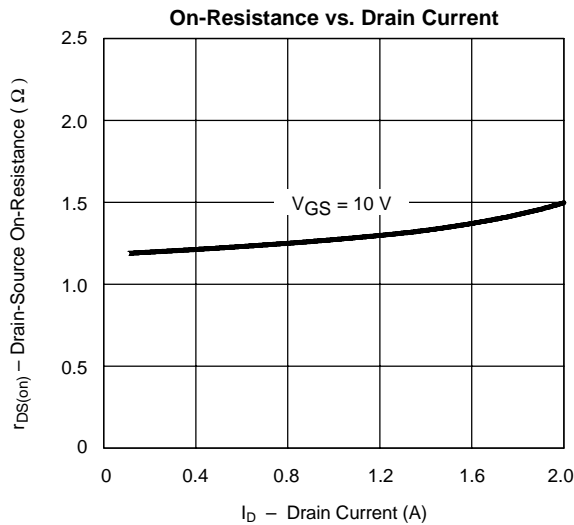
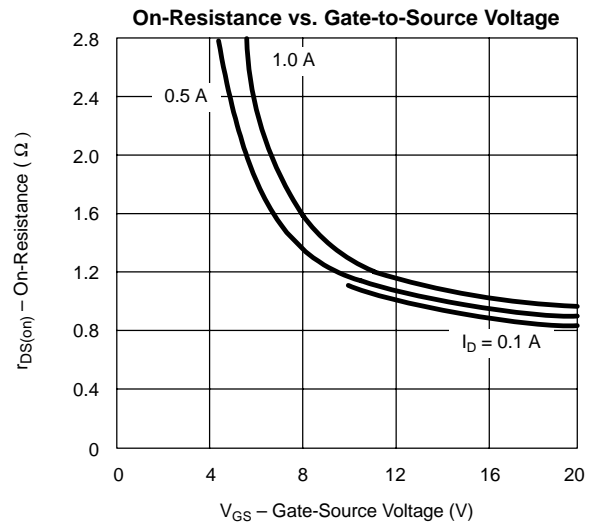
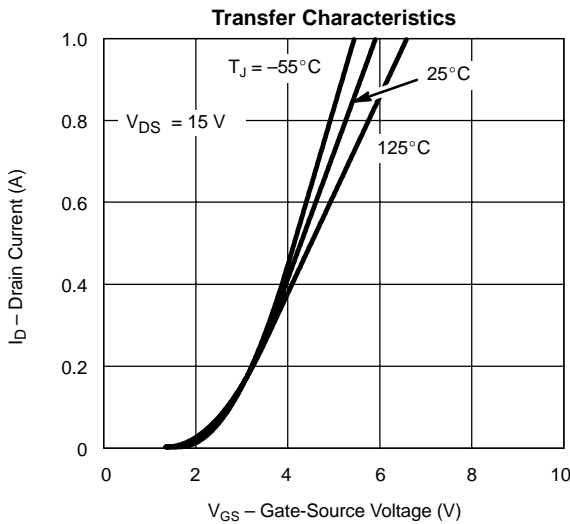
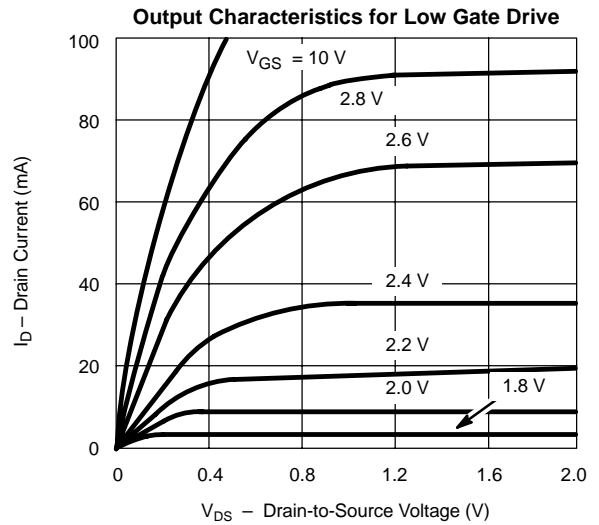
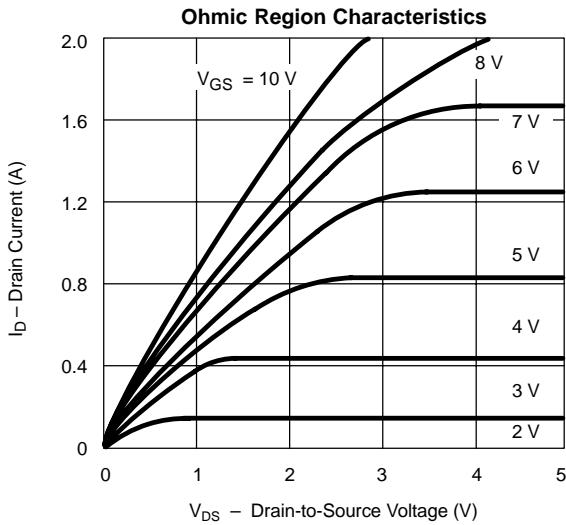
Notes

- a. For DESIGN AID ONLY, not subject to production testing.
- b. Pulse test: PW ≤ 80 μs duty cycle ≤ 1%.
- c. Switching time is essentially independent of operating temperature.
- d. This parameter not registered with JEDEC on 2N6660.

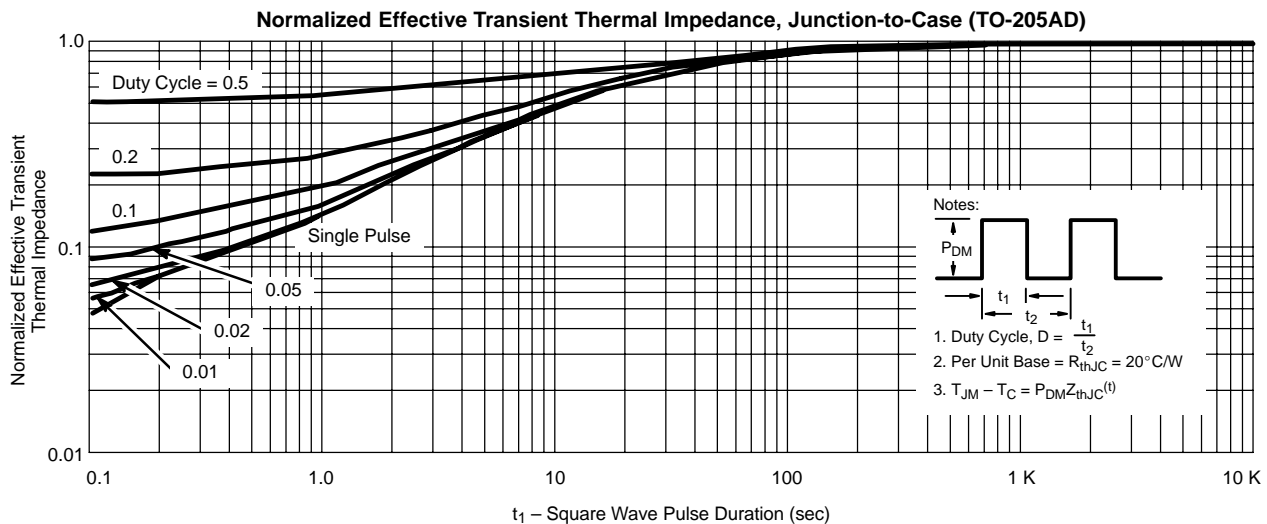
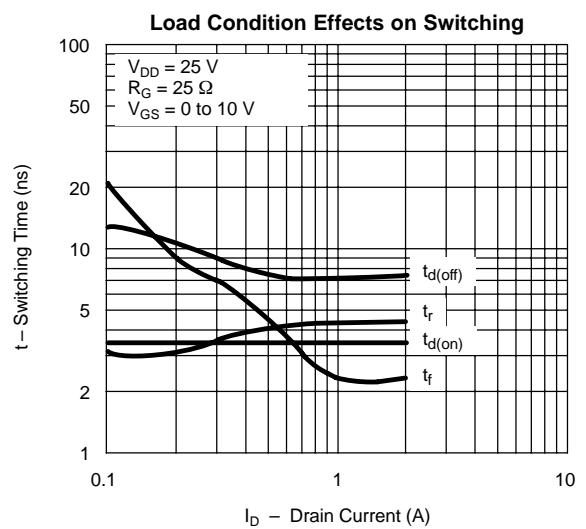
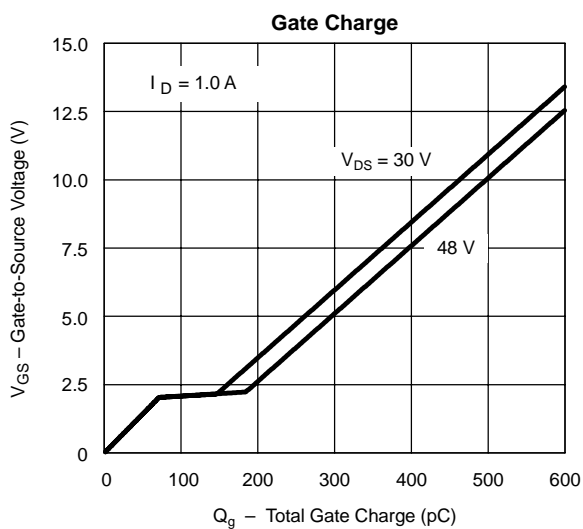
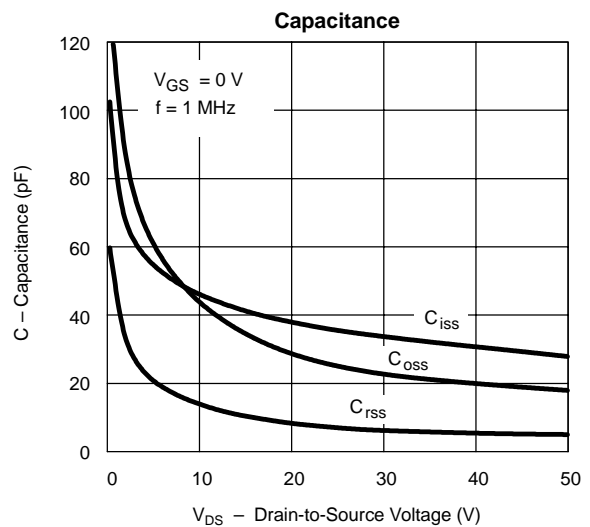
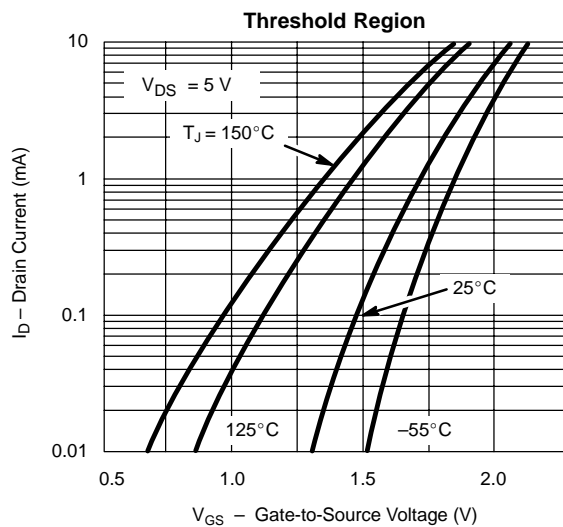
VNDQ06



TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)



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