

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

PRODUCT SUMMARY				
Part Number	$V_{(BR)DSS}$ Min (V)	$r_{DS(on)}$ Max ( $\Omega$ )	$V_{GS(th)}$ (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

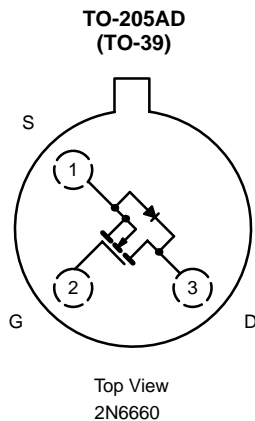
- Low On-Resistance: 1.3  $\Omega$
- Low Threshold: 1.7 V
- Low Input Capacitance: 35 pF
- Fast Switching Speed: 8 ns
- Low Input and Output Leakage

### BENEFITS

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

### APPLICATIONS

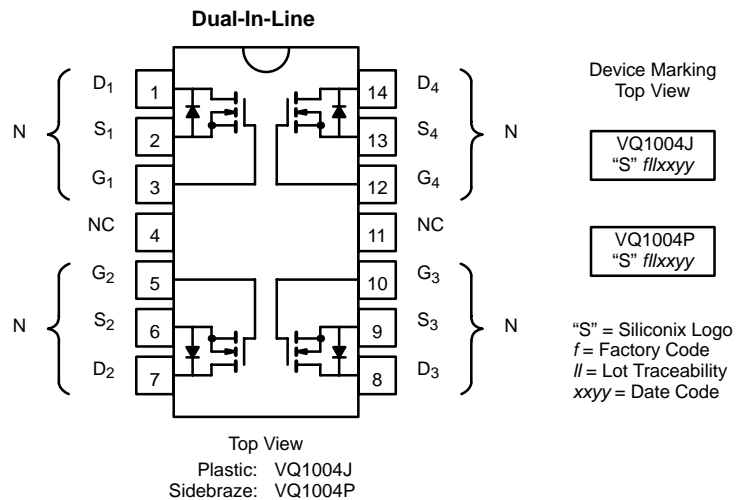
- Direct Logic-Level Interface: TTL/CMOS
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems
- Solid-State Relays



Device Marking  
Side View

2N6660  
"S" flxxyy

"S" = Siliconix Logo  
f = Factory Code  
ll = Lot Traceability  
xyyy = Date Code



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	$V_{GS}$	$\pm 20$	$\pm 30$	$\pm 20$			
Continuous Drain Current ( $T_J = 150^\circ\text{C}$ )	$I_D$	$T_C = 25^\circ\text{C}$	1.1	0.46	$\pm 0.46$	A	
		$T_C = 100^\circ\text{C}$	0.8	0.26	0.26		
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	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 <sup>b</sup>	$R_{thJA}$	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 ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)									
Parameter	Symbol	Test Conditions	Typ <sup>a</sup>	Limits				Unit	
				2N6660		VQ1004J/P			
				Min	Max	Min	Max		
<b>Static</b>									
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 10\ \mu\text{A}$	75	60		60		V	
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 1\text{ mA}$	1.7	0.8	2	0.8	2.5		
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 15\text{ V}$ $T_C = 125^\circ\text{C}$			$\pm 100$		$\pm 100$	nA	
					$\pm 500$		$\pm 500$		
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$ $V_{DS} = 35\text{ V}, V_{GS} = 0\text{ V}$ $V_{DS} = 48\text{ V}, V_{GS} = 0\text{ V}$ $T_C = 125^\circ\text{C}$ $V_{DS} = 28\text{ V}, V_{GS} = 0\text{ V}$ $T_C = 125^\circ\text{C}$			10			$\mu\text{A}$	
						500			500
On-State Drain Current <sup>b</sup>	$I_{D(on)}$	$V_{DS} = 10\text{ V}, V_{GS} = 10\text{ V}$	3	1.5		1.5		A	
Drain-Source On-Resistance <sup>b</sup>	$r_{DS(on)}$	$V_{GS} = 5\text{ V}, I_D = 0.3\text{ A}^d$ $V_{GS} = 10\text{ V}, I_D = 1\text{ A}$ $T_C = 125^\circ\text{C}^d$	2		5		5	$\Omega$	
			1.3		3		3.5		
			2.4		4.2		4.9		
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 10\text{ V}, I_D = 0.5\text{ A}$	350	170		170		mS	
Common Source Output Conductance <sup>b</sup>	$g_{os}$	$V_{DS} = 10\text{ V}, I_D = 0.1\text{ A}$	1						
Diode Forward Voltage	$V_{SD}$	$I_S = 0.99\text{ A}, V_{GS} = 0\text{ V}$	0.8					V	
<b>Dynamic</b>									
Input Capacitance	$C_{iss}$	$V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}$ $f = 1\text{ MHz}$	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				
<b>Switching<sup>c</sup></b>									
Turn-On Time	$t_{ON}$	$V_{DD} = 25\text{ V}, R_L = 23\ \Omega$ $I_D \cong 1\text{ A}, V_{GEN} = 10\text{ V}$ $R_G = 25\ \Omega$	8		10		10	ns	
Turn-Off Time	$t_{OFF}$		8.5		10		10		

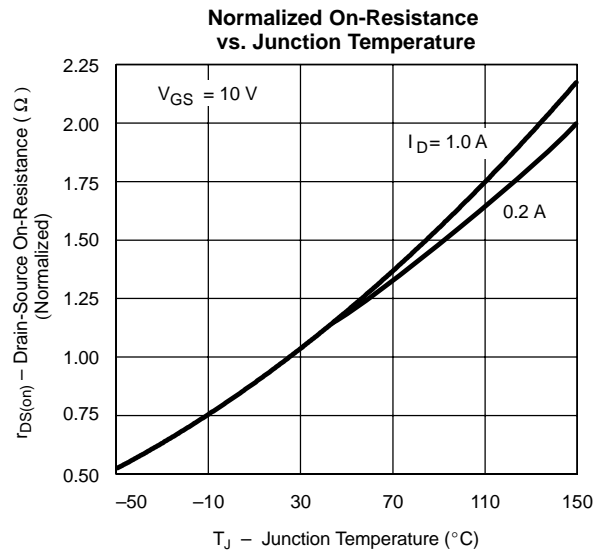
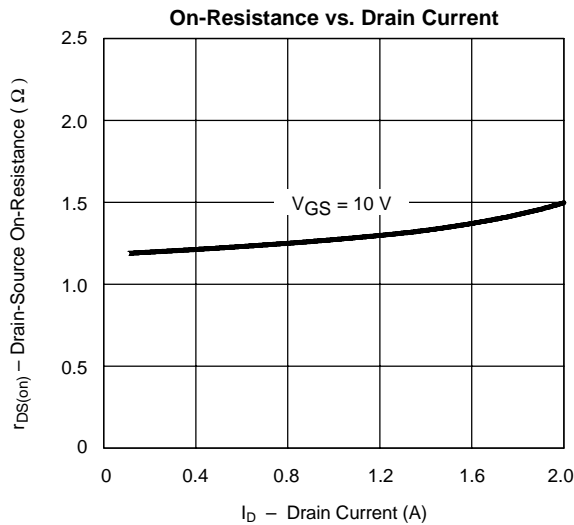
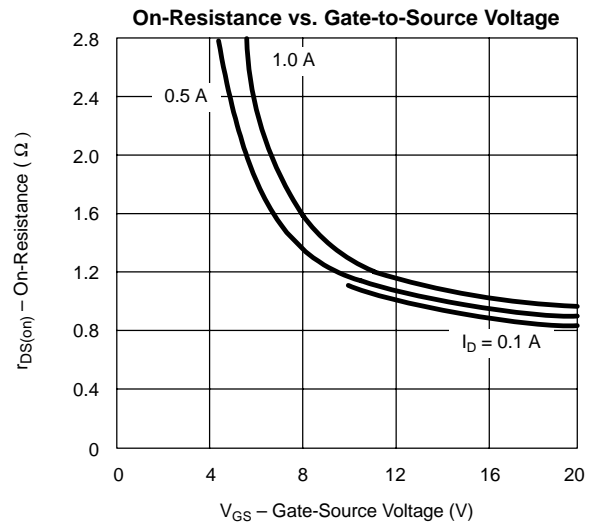
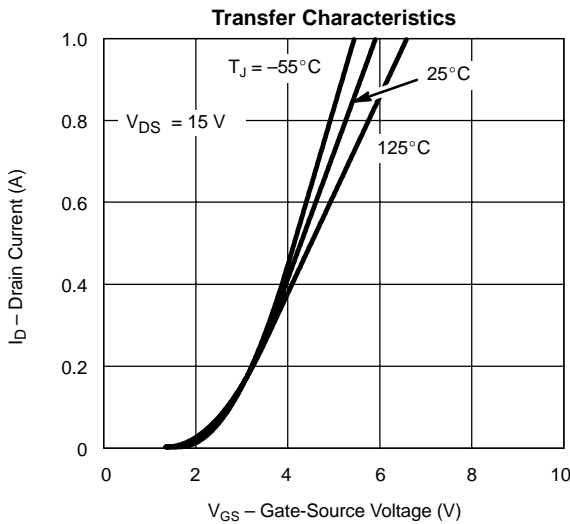
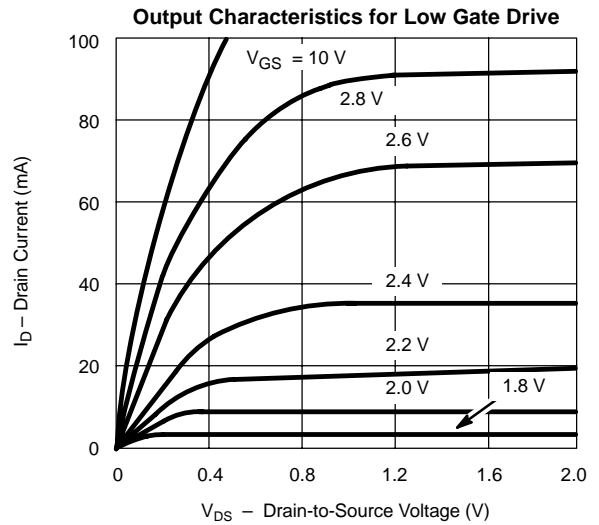
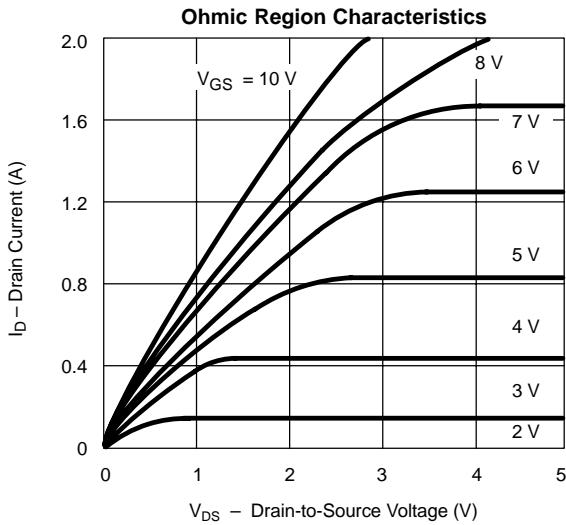
## Notes

- For DESIGN AID ONLY, not subject to production testing.
- Pulse test:  $PW \leq 80\ \mu\text{s}$  duty cycle  $\leq 1\%$ .
- Switching time is essentially independent of operating temperature.
- This parameter not registered with JEDEC on 2N6660.

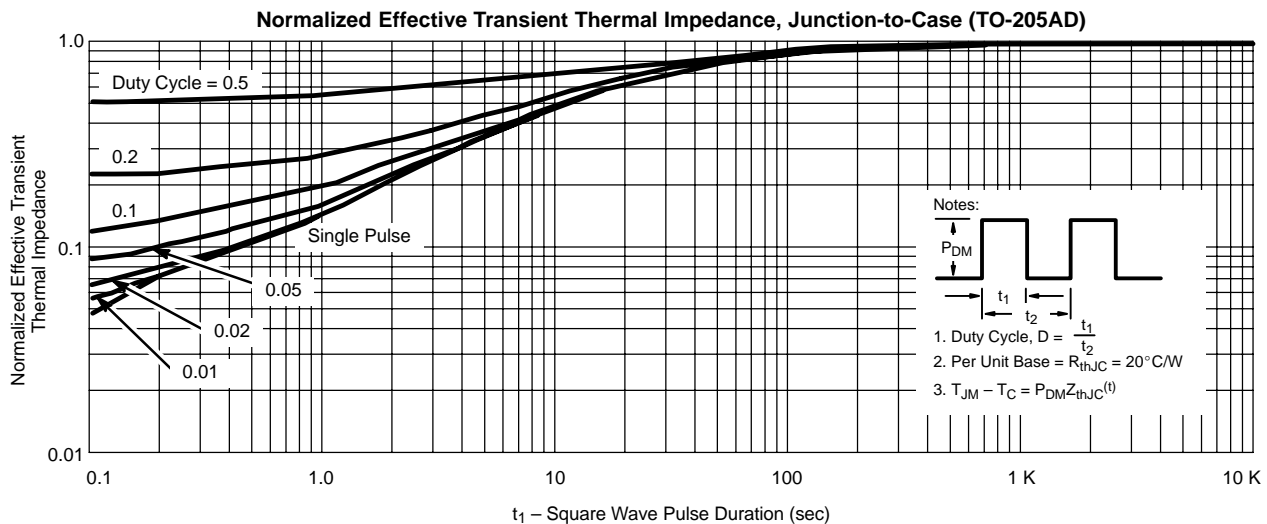
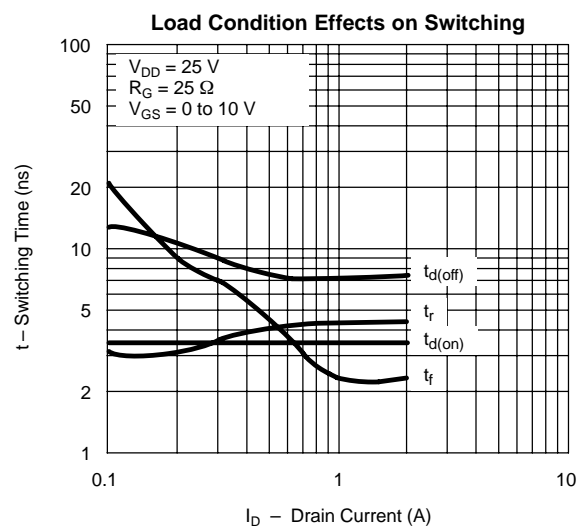
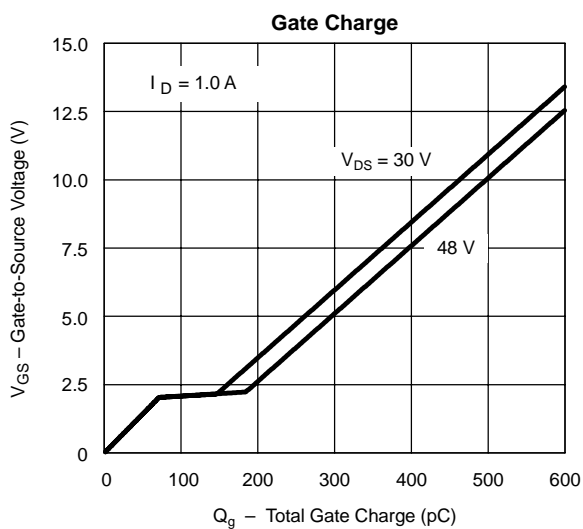
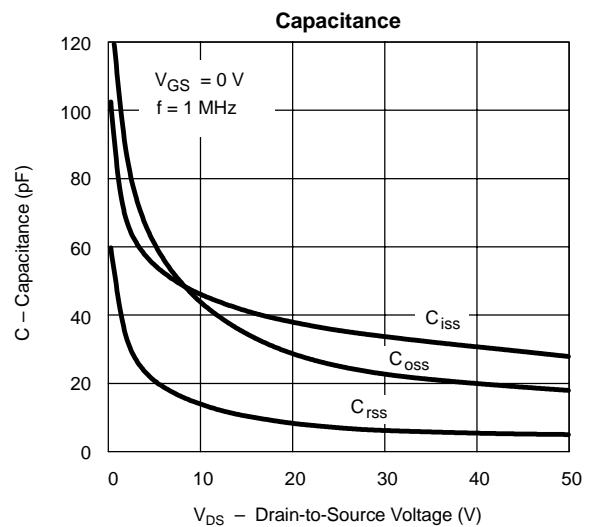
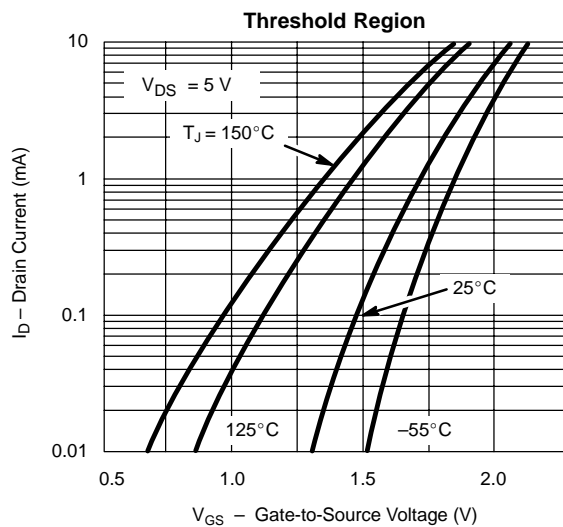
VNDQ06



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



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





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