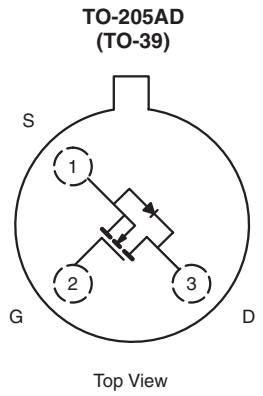
N-Channel 60 V (D-S) MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	60
$R_{DS(on)}$ (Ω) at V_{GS} = 10 V	3
Configuration	Single



Top View

FEATURES

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

Pb-free Available

BENEFITS

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

APPLICATIONS

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

ORDERING INFORMATION

PART	PACKAGE	DESCRIPTION/DSCC PART NUMBER	VISHAY ORDERING PART NUMBER
2N6660	TO-205AD (TO-39)	Commercial	2N6660
		Commercial, Lead (Pb)-free	2N6660-E3
2N6660-2		See -2 Flow Document	2N6660-2
2N6660JANTX		JANTX2N6660 (std Au leads)	2N6660JTX02
		JANTX2N6660 (with solder)	2N6660JTXL02
		JANTX2N6660P (with PIND)	2N6660JTXP02
2N6660JANTXV		JANTXV2N6660 (std Au leads)	2N6660JTXV02
		JANTXV2N6660P (with PIND)	2N6660JTVP02

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	0.99	A
	T_C = 100 °C		0.62	
Pulsed Drain Current[a]		I_{DM}	3	
Maximum Power Dissipation	T_C = 25 °C	P_D	6.25	W
	T_A = 25 °C		0.725	
Thermal Resistance, Junction-to-Ambient[b]		R_{thJA}	170	°C/W
Thermal Resistance, Junction-to-Case		R_{thJC}	20	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C

Notes
a. Pulse width limited by maximum junction temperature.
b. Not required by military spec.

SPECIFICATIONS (T_A = 25 °C, unless otherwise noted)

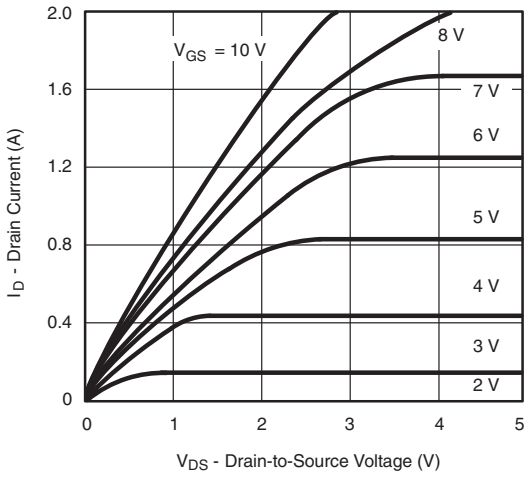
PARAMETER	SYMBOL	TEST CONDITIONS	LIMITS MIN.	LIMITS TYP.[a]	LIMITS MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{DS} = 0 V, I_D = 10 µA	60	75	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 1 mA	0.8	1.7	2	V
		T_C = - 55 °C	-	-	2.5	V
		T_C = 125 °C	0.3	-	-	V
Gate-Body Leakage	I_{GSS}	V_{GS} = ± 20 V, V_{DS} = 0 V	-	-	± 100	nA
		T_C = 125 °C	-	-	± 500	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 48 V	-	-	1	µA
		T_C = 125 °C	-	-	100	µA
On-State Drain Current	$I_{D(on)}$	V_{GS} = 10 V, V_{DS} = 10 V	-	2	-	A
Drain-Source On-State Resistance[b]	$R_{DS(on)}$	V_{GS} = 5 V, I_D = 0.3 A	-	2	5	Ω
		V_{GS} = 10 V, I_D = 1 A	-	1.3	3	Ω
		T_C = 125 °C	-	2.4	5.6	Ω
Forward Transconductance[b]	g_{fs}	V_{DS} = 7.5 V, I_D = 0.525 A	170	350	-	mS
Diode Forward Voltage	V_{SD}	I_S = 0.99 A, V_{GS} = 0 V	0.7	0.8	1.6	V
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	-	35	50	pF
Output Capacitance	C_{oss}		-	25	40	pF
Reverse Transfer Capacitance	C_{rss}		-	7	10	pF
Drain-Source Capacitance	C_{ds}		-	30	-	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	-	8	10	ns
Turn-Off Time	t_{OFF}		-	8.5	10	ns

Notes

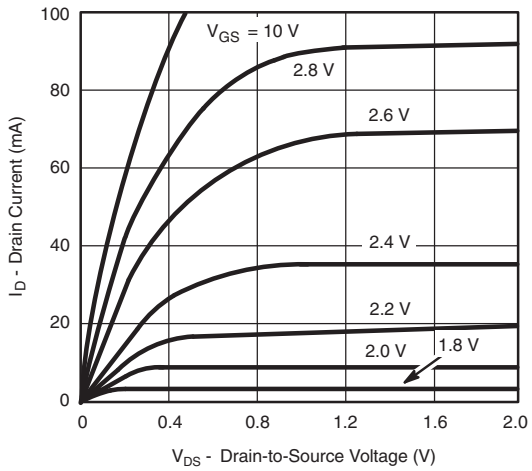
a. FOR DESIGN AID ONLY, not subject to production testing.
b. Pulse test: PW ≤ 300 µs duty cycle ≤ 2 %.
c. Switching time is essentially independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

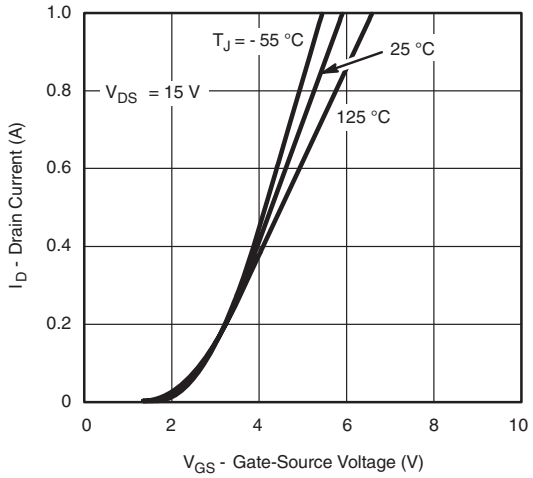
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



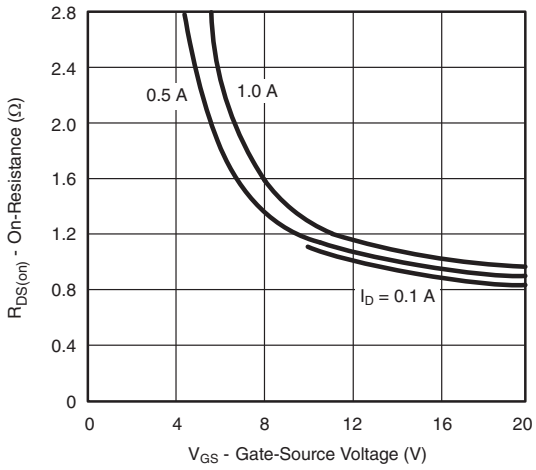
Ohmic Region Characteristics



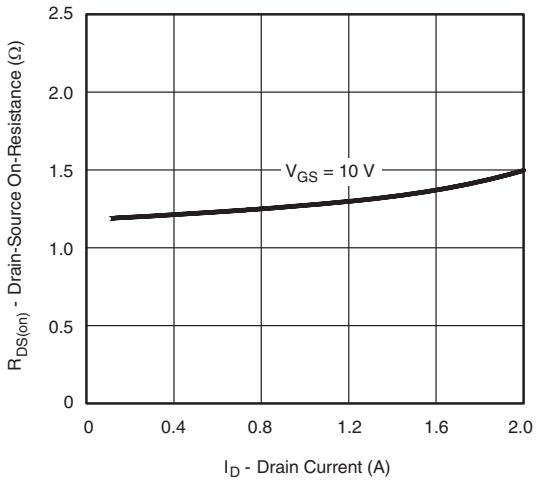
Output Characteristics for Low Gate Drive



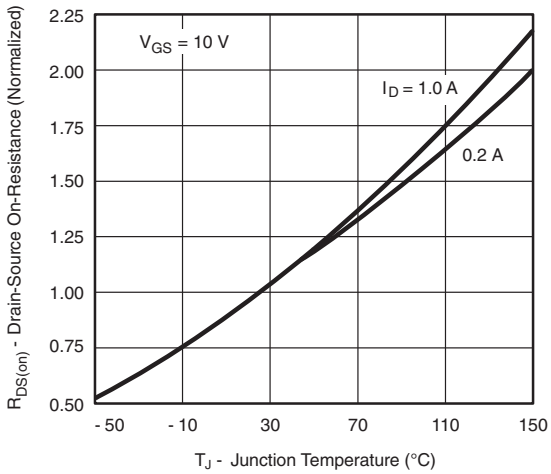
Transfer Characteristics



On-Resistance vs. Gate-to-Source Voltage

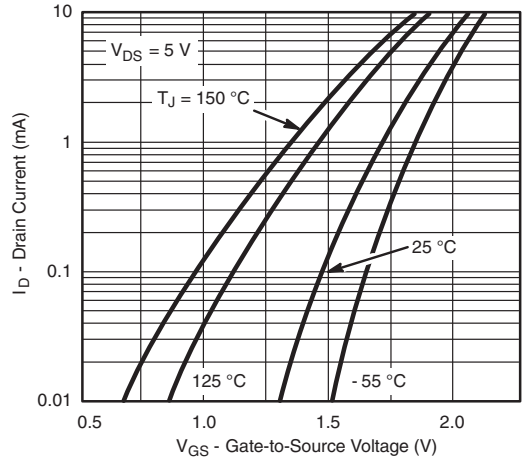


On-Resistance vs. Drain Current

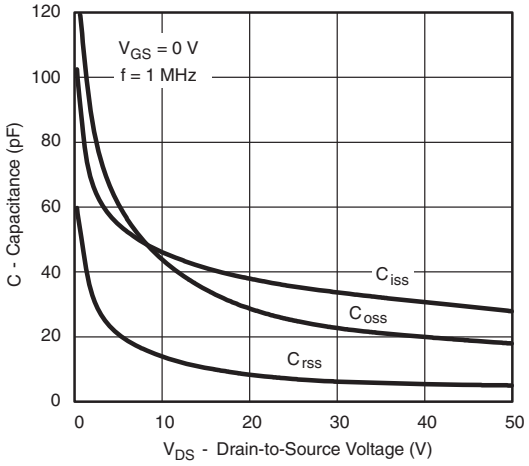


Normalized On-Resistance vs. Junction Temperature

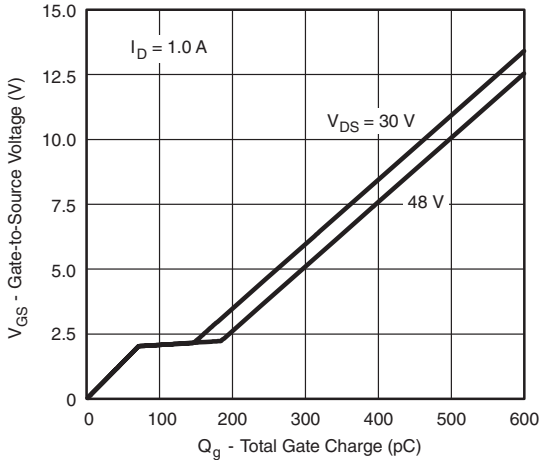
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



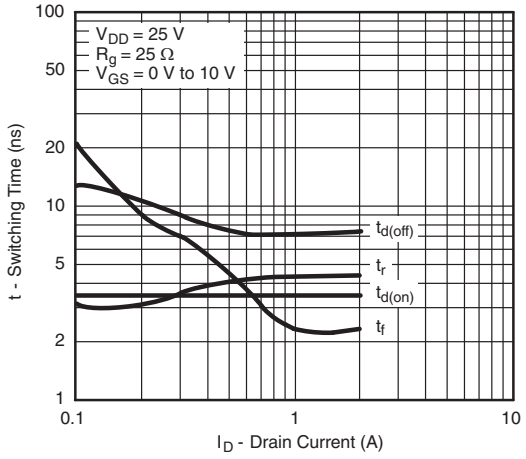
Threshold Region



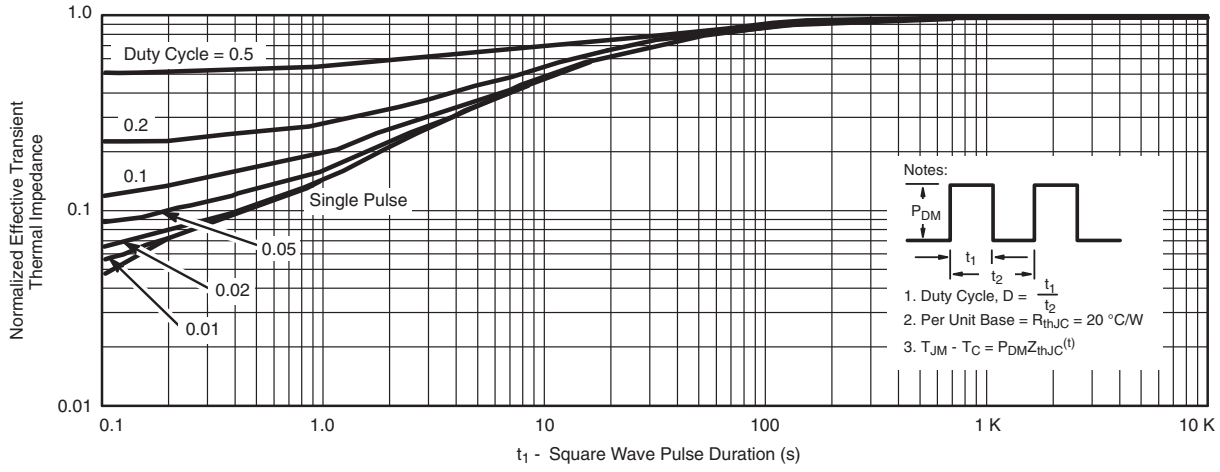
Capacitance



Gate Charge



Load Condition Effects on Switching



Normalized Thermal Transient Impedance, Junction-to-Ambient

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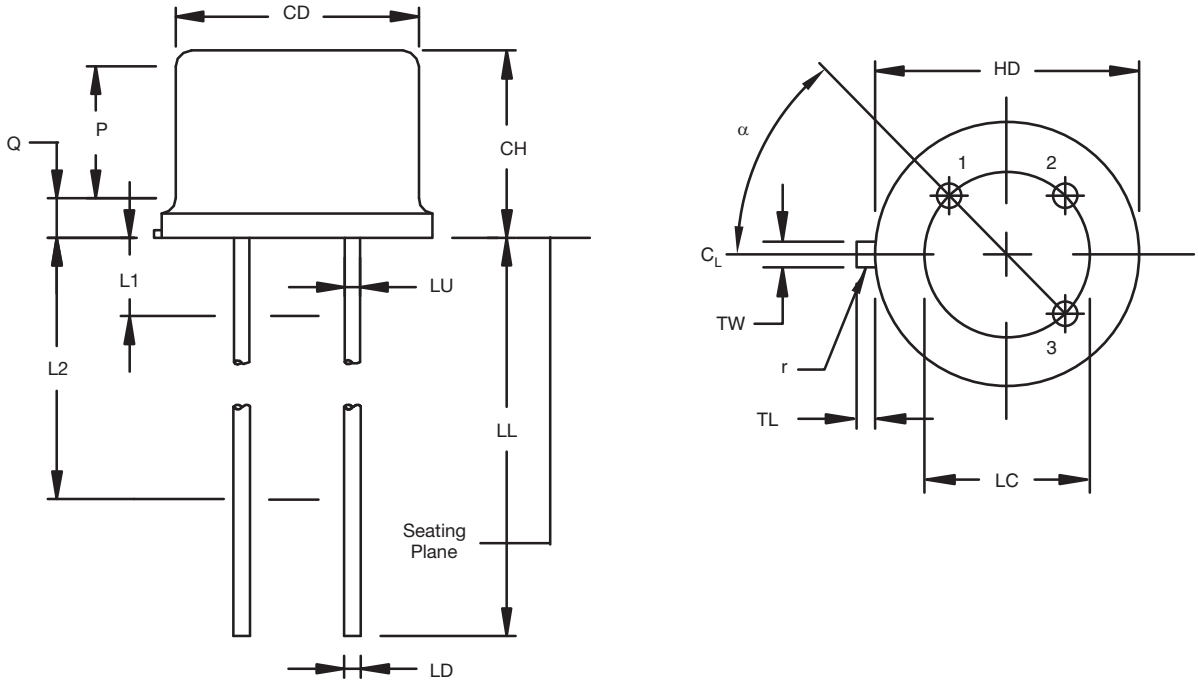
TO-205AD (TO-39 TALL LID)



DIM.	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
CD	0.305	0.335	7.75	8.51
CH	0.240	0.260	6.10	6.60
HD	0.335	0.370	8.51	9.40
LC [6]	0.200 TP		5.08 TP	
LD [7][8]	0.016	0.021	0.41	0.53
LL [7][8]	0.500	0.750	12.70	19.05
LU [7][8]	0.016	0.019	0.41	0.48
L1 [7][8]	—	0.050	—	1.27
L2 [7][8]	0.250	—	6.35	—
P [5]	0.100	—	2.54	—
Q [4]	—	0.050	—	1.27
r [9]	—	0.010	—	0.25
TL [3]	0.029	0.045	0.74	1.14
TW [2]	0.028	0.034	0.71	0.86
α [6]	45° TP		45° TP	
ECN: S15-1675-Rev. D, 27-Jul-15 DWG: 5511				

Notes

(1) Dimensions are in inches. Metric equivalents are given for general information only.
(2) Beyond radius (r) maximum, TW shall be held for a minimum length of 0.011" (0.028 mm).
(3) Dimension TL measured from maximum HD.
(4) Outline in this zone is not controlled.
(5) Dimension CD shall not vary more than 0.010 (0.25 mm) in zone P. This zone is controlled for automatic handling.
(6) Leads at guage plane 0.054" + 0.001", - 0.000" (1.37 mm + 0.03 mm, - 0.00 mm) below seating plane shall be within 0.007" (0.18 mm) radius of true position (TP) at maximum material condition (MMC) relative to tab at MMC.
(7) LU applies between L1 and L2, LD applies between L2 and L maximum. Diameter is uncontrolled in L1 and beyond LL minimum.
(8) All three leads.
(9) Radius (r) applies to both inside corners of tab.
(10) Drain is electrically connected to the case.

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