

# 2N6661

## N-Channel Enhancement Mode MOSPOWER



### SOLID STATE INC.

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### APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

### PRODUCT SUMMARY

Part Number	$V_{DSS}$ Volts	$r_{DS(ON)}$ (ohms)	Package
2N6661	90	4	T0-205AF

PIN 1 – Source  
PIN 2 – Gate  
PIN 3 & CASE – Drain

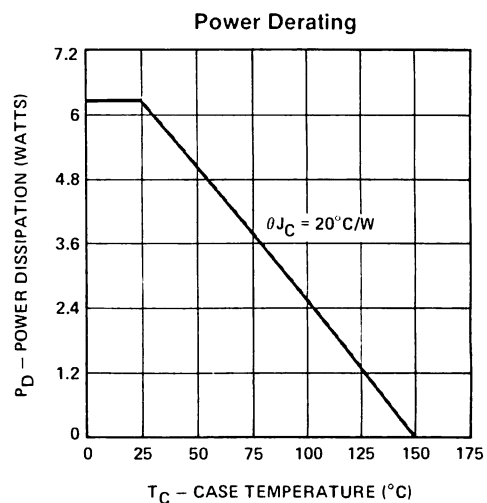
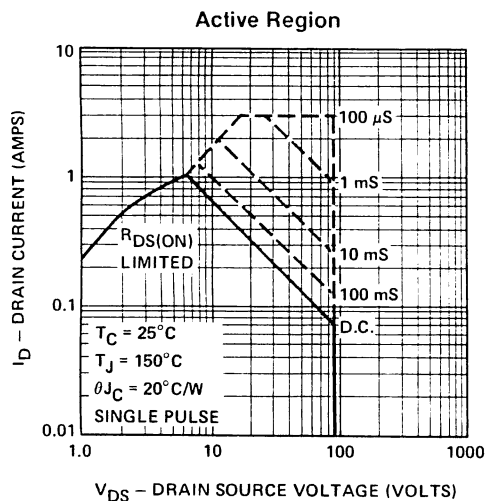


T0-205AF (T0-39)

### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Parameter	2N6661	Units
$V_{DS}$ Drain-Source Voltage	90	V
$V_{DGR}$ Drain-Gate Voltage ( $R_{GS} = 1\text{ M}\Omega$ )	90	V
$I_D @ T_C = 25^\circ\text{C}$ Continuous Drain Current	$\pm 0.9$	A
$I_D @ T_C = 100^\circ\text{C}$ Continuous Drain Current	$\pm 0.7$	A
$I_{DM}$ Pulsed Drain Current <sup>1</sup>	$\pm 3$	A
$V_{GS}$ Gate-Source Voltage	$\pm 40$	V
$P_D @ T_C = 25^\circ\text{C}$ Max. Power Dissipation	6.25	W
$P_D @ T_C = 100^\circ\text{C}$ Max. Power Dissipation	2.5	W
Junction to Case Linear Derating Factor	0.05	$\text{W}/^\circ\text{C}$
Junction to Ambient Linear Derating Factor	0.006	$\text{W}/^\circ\text{C}$
$T_J$ Operating and Storage Temperature Range	-55 To +150	$^\circ\text{C}$
Lead Temperature (1/16" from case for 10 secs.)	300	$^\circ\text{C}$

<sup>1</sup> Pulse Test: Pulsewidth  $\leq 300\mu\text{sec}$ , Duty Cycle  $\leq 2\%$



# ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

## STATIC

Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
$BV_{DSS}$ Drain-Source Breakdown Voltage	2N6661	90	110		V	$V_{GS} = 0$ $I_D = 10\ \mu\text{A}$
$V_{GS(th)}$ Gate-Threshold Voltage	2N6661	0.8	1.5	2	V	$V_{DS} = V_{GS}, I_D = 1\ \text{mA}$
$I_{GSSF}$ Gate-Body Leakage Forward	2N6661		1 5	100 500	nA	$V_{GS} = +15\text{V}, V_{DS} = 0$ $V_{GS} = +15\text{V}, V_{DS} = 0, T_A = 125^\circ\text{C}$
$I_{GSSR}$ Gate-Body Leakage Reverse	2N6661		-1	-100	nA	$V_{GS} = -15\text{V}, V_{DS} = 0$
$I_{DSS}$ Zero Gate Voltage Drain Current	2N6661		1	10	$\mu\text{A}$	$V_{DS} = \text{Max. Rating}, V_{GS} = 0$
	2N6661		50	500	$\mu\text{A}$	$V_{DS} = 0.8\ \text{Max. Rating}, V_{GS} = 0$ $T_C = 125^\circ\text{C}$
$I_{D(on)}$ On-State Drain Current <sup>1</sup>	2N6661	1.5	1.7		A	$V_{DS} \geq 2V_{DS(ON)}, V_{GS} = 10\text{V}$
$V_{DS(on)}$ Static Drain-Source On-State Voltage <sup>1</sup>	2N6661		1.2	1.6	V	$V_{GS} = 5\text{V}, I_D = 0.3\text{A}$
	2N6661		3	4	V	$V_{GS} = 10\text{V}, I_D = 1\text{A}$
$R_{DS(on)}$ Static Drain-Source On-State Resistance <sup>1</sup>	2N6661		4	5.3	$\Omega$	$V_{GS} = 5\text{V}, I_D = 0.3\text{A}$
	2N6661		3	4	$\Omega$	$V_{GS} = 10\text{V}, I_D = 1\text{A}$
$R_{DS(on)}$ Static Drain-Source On-State Resistance <sup>1</sup>	2N6661		4.1	5.5	$\Omega$	$V_{GS} = 10\text{V}, I_D = 1\text{A}, T_C = 125^\circ\text{C}$

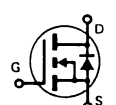
## DYNAMIC

$g_{fs}$ Forward Transconductance <sup>1</sup>	2N6661	170	195		mS (m $\Omega$ )	$V_{DS} \geq 2V_{DS(ON)}, I_D = 0.5\text{A}$
$C_{iss}$ Input Capacitance	2N6661		35	50	pF	$V_{GS} = 0, V_{DS} = 25\text{V}$ $f = 1\ \text{MHz}$
$C_{oss}$ Output Capacitance	2N6661		33	40	pF	
$C_{rss}$ Reverse Transfer Capacitance	2N6661		2	10	pF	
$t_{d(on)}$ Turn-On Delay Time	2N6661		8	10	ns	$V_{DD} = 25\text{V}, I_D \geq 1\text{A}$ $R_g = 25\ \Omega, R_L = 23\ \Omega$ (MOSFET switching times are essentially independent of operating temperature.)
$t_{d(off)}$ Turn-Off Delay Time	2N6661		8	10	ns	

## THERMAL RESISTANCE

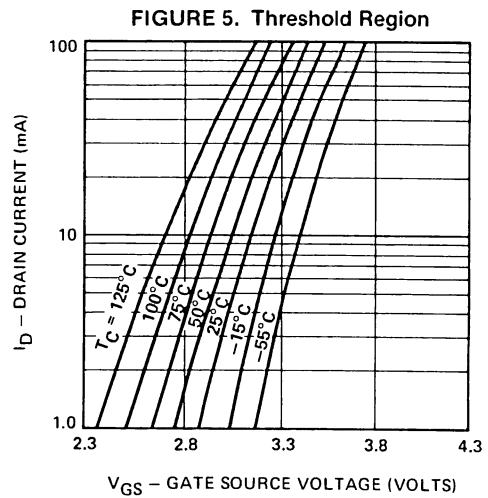
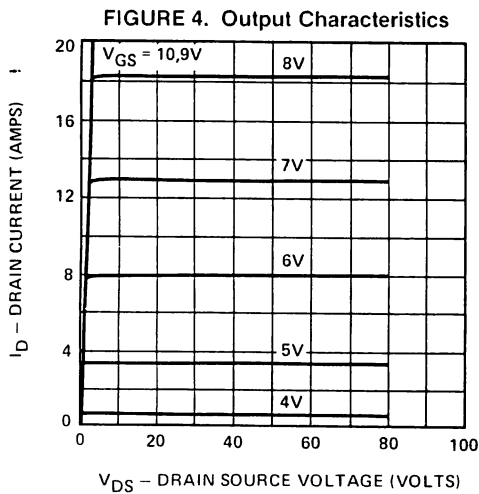
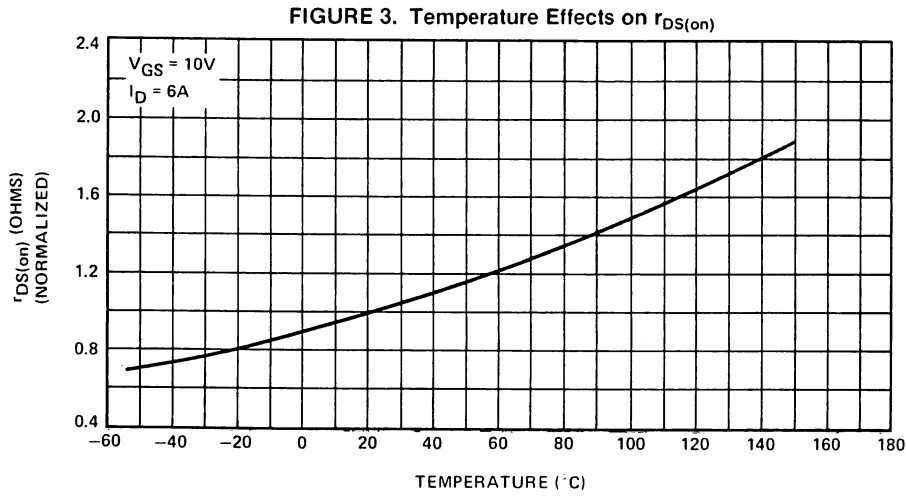
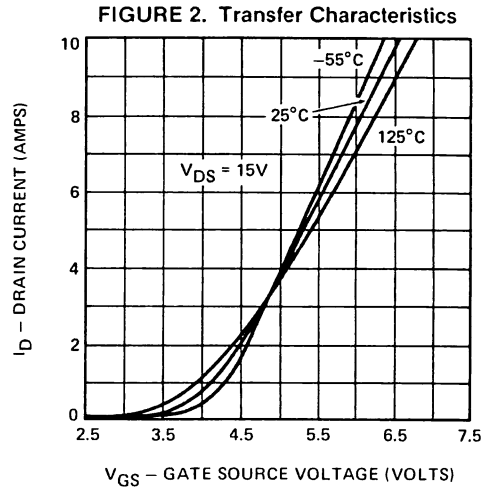
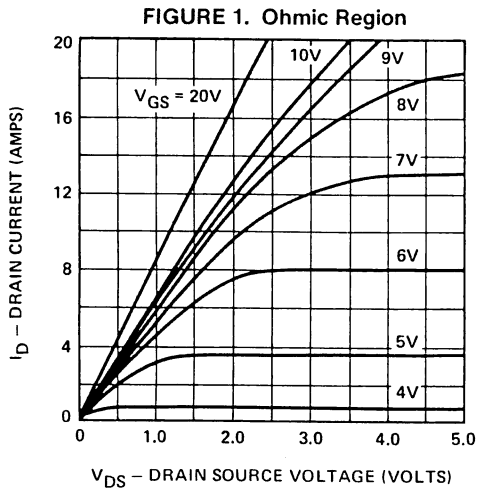
$R_{thJC}$ Junction-to-Case	2N6661			20	$^\circ\text{C/W}$	
$R_{thJA}$ Junction-to-Ambient	2N6661			170	$^\circ\text{C/W}$	Free Air Operation

## BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

$I_S$ Continuous Source Current (Body Diode)	2N6661			-0.9	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
$I_{SM}$ Source Current <sup>1</sup> (Body Diode)	2N6661			-3	A	
$V_{SD}$ Diode Forward Voltage <sup>1</sup>	2N6661		-1.2		V	$T_C = 25^\circ\text{C}, I_S = -0.9\text{A}, V_{GS} = 0$

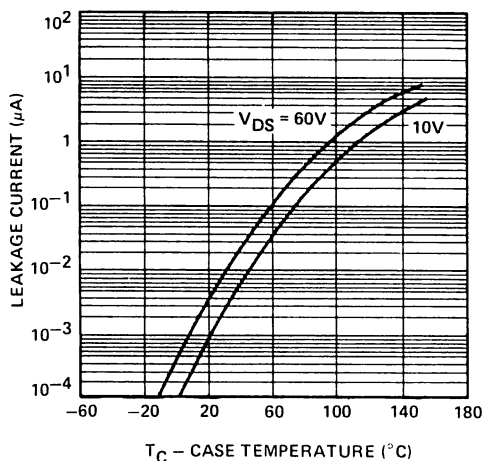
<sup>1</sup> Pulse Test: Pulse Width  $\leq 300\ \mu\text{sec}$ , Duty Cycle  $\leq 2\%$

# TYPICAL PERFORMANCE CURVES (25°C unless otherwise noted)

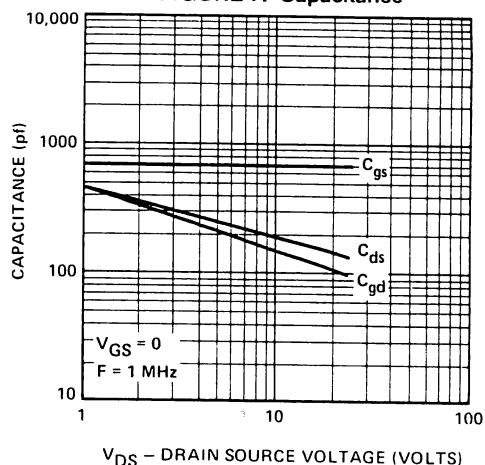


# TYPICAL PERFORMANCE CURVES—Continued

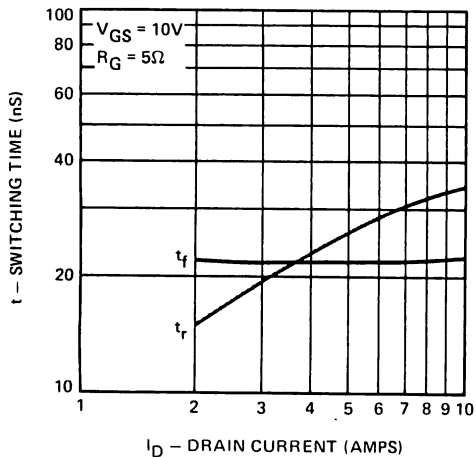
**FIGURE 6. Off-State Current**



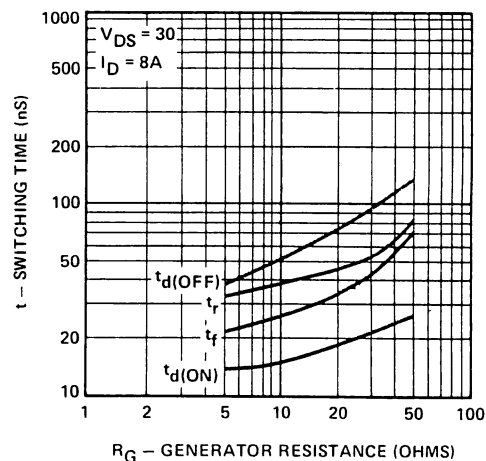
**FIGURE 7. Capacitance**



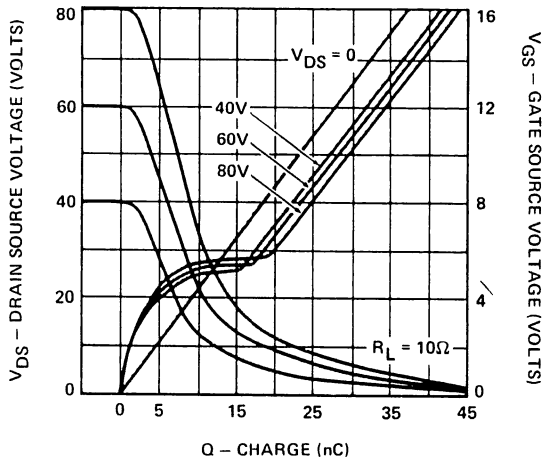
**FIGURE 8. Effects on Load Conditions**



**FIGURE 9. Effects of Drive Resistance**



**FIGURE 10. Turn-on Charge**



# TRANSIENT THERMAL RESPONSE CURVES

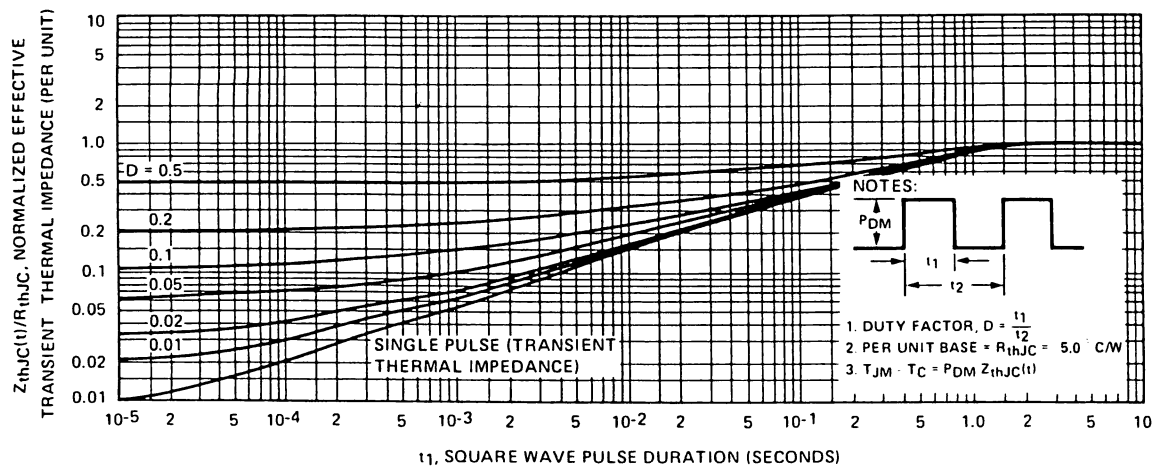
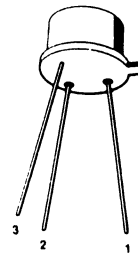
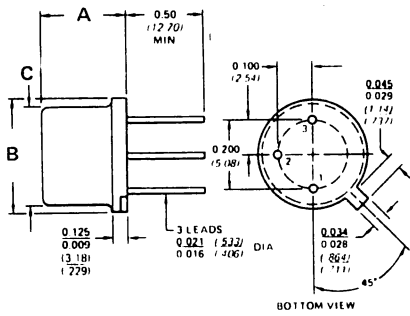


FIGURE 3. TO-39 Package

# TO-205 (TO-39)



All Dimensions in Inches  
(All Dimensions in Millimeters)

Package	Dimension					
	A		B		C	
TO-205AD	0.260	(6.60)	0.370	(9.39)	0.335	(8.50)
	0.240	(6.10)	0.335	(8.51)	0.305	(7.75)
TO-205AF	0.180	(4.57)	0.370	(9.39)	0.355	(9.01)
	0.160	(4.07)	0.340	(8.64)	0.315	(8.01)