



## FDC5661N\_F085

### N-Channel Logic Level PowerTrench® MOSFET

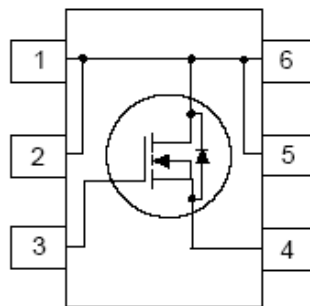
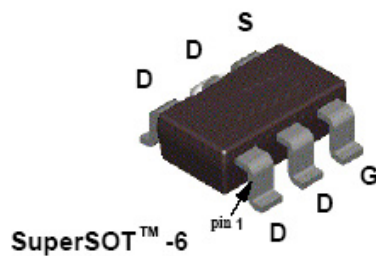
60V, 4A, 60mΩ

#### Features

- $R_{DS(on)} = 47m\Omega$  at  $V_{GS} = 10V$ ,  $I_D = 4.3A$
- $R_{DS(on)} = 60m\Omega$  at  $V_{GS} = 4.5V$ ,  $I_D = 4A$
- Typ  $Q_g(TOT) = 14.5nC$  at  $V_{GS} = 10V$
- Low Miller Charge
- Qualified to AEC Q101
- RoHS Compliant

#### Applications

- DC/DC converter
- Motor Drives



## MOSFET Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Ratings	Units
$V_{DSS}$	Drain to Source Voltage	60	V
$V_{GS}$	Gate to Source Voltage	$\pm 20$	V
$I_D$	Drain Current Continuous ( $V_{GS} = 10\text{V}$ )	4.3	A
	Pulsed	20	
$P_D$	Power Dissipation	1.6	W
$T_J, T_{STG}$	Operating and Storage Temperature	-55 to +150	$^\circ\text{C}$

## Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case	30	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-263, 1in <sup>2</sup> copper pad area	78	$^\circ\text{C/W}$

## Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
.661N	FDC5661N_F085	SSOT-6	7"	8mm	3000 units

## Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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### Off Characteristics

$B_{VDSS}$	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	60	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 48\text{V}, V_{GS} = 0\text{V}$	-	-	1	$\mu\text{A}$
		$T_A = 150^\circ\text{C}$	-	-	250	
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}$	-	-	$\pm 100$	nA

### On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	1	2.0	3	V
$r_{DS(on)}$	Drain to Source On Resistance	$I_D = 4.3\text{A}, V_{GS} = 10\text{V}$	-	38	47	m $\Omega$
		$I_D = 4\text{A}, V_{GS} = 4.5\text{V}$	-	46	60	
		$I_D = 4.3\text{A}, V_{GS} = 10\text{V}, T_J = 150^\circ\text{C}$	-	69	86	

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$	-	763	-	pF
$C_{oss}$	Output Capacitance		-	68	-	pF
$C_{rss}$	Reverse Transfer Capacitance		-	36	-	pF
$R_G$	Gate Resistance	$f = 1\text{MHz}$	-	2.6	-	$\Omega$
$Q_{g(TOT)}$	Total Gate Charge at 10V	$V_{GS} = 0$ to 10V $V_{DD} = 30\text{V}, I_D = 4.3\text{A}$	-	14.5	19	nC
$Q_{gs}$	Gate to Source Gate Charge		-	2.4	-	nC
$Q_{gd}$	Gate to Drain "Miller" Charge		-	2.9	-	nC

**Electrical Characteristics**  $T_A = 25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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**Switching Characteristics**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$t_{on}$	Turn-On Time	$V_{DD} = 30\text{V}, I_D = 4.3\text{A}$ $V_{GS} = 10\text{V}, R_{GS} = 6\Omega$	-	-	17.6	ns
$t_{d(on)}$	Turn-On Delay Time		-	7.2	-	ns
$t_r$	Rise Time		-	1.6	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	19.3	-	ns
$t_f$	Fall Time		-	3.1	-	ns
$t_{off}$	Turn-Off Time		-	-	36	ns

**Drain-Source Diode Characteristics**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$V_{SD}$	Source to Drain Diode Voltage	$I_{SD} = 4.3\text{A}$	-	0.8	1.25	V
		$I_{SD} = 2.1\text{A}$	-	0.8	1.0	
$t_{rr}$	Reverse Recovery Time	$I_{SD} = 4.3\text{A}, dI_{SD}/dt = 100\text{A}/\mu\text{s}$	-	18.4	24	ns
$Q_{rr}$	Reverse Recovery Charge		-	10.0	13	nC

This product has been designed to meet the extreme test conditions and environment demanded by the automotive industry. For a copy of the requirements, see AEC Q101 at: <http://www.aecouncil.com/>  
 All Fairchild Semiconductor products are manufactured, assembled and tested under ISO9000 and QS9000 quality systems certification.

### Typical Characteristics

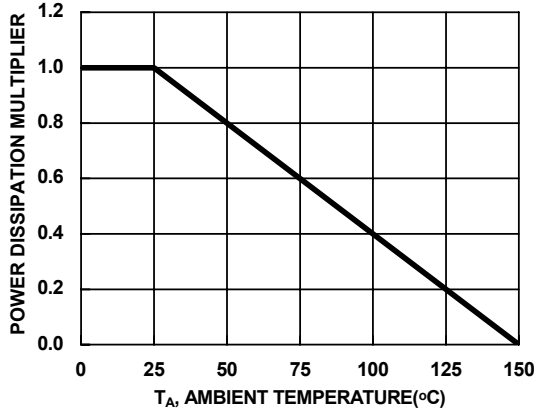


Figure 1. Normalized Power Dissipation vs Ambient Temperature

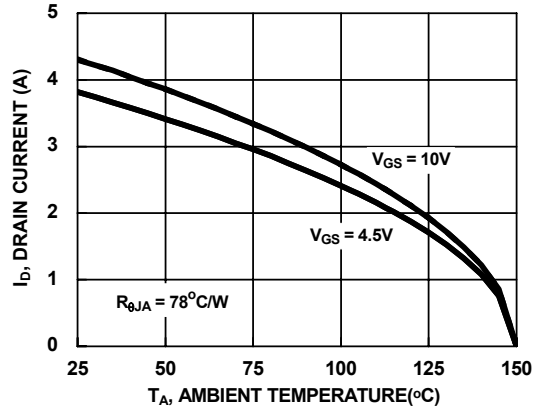


Figure 2. Maximum Continuous Drain Current vs Ambient Temperature

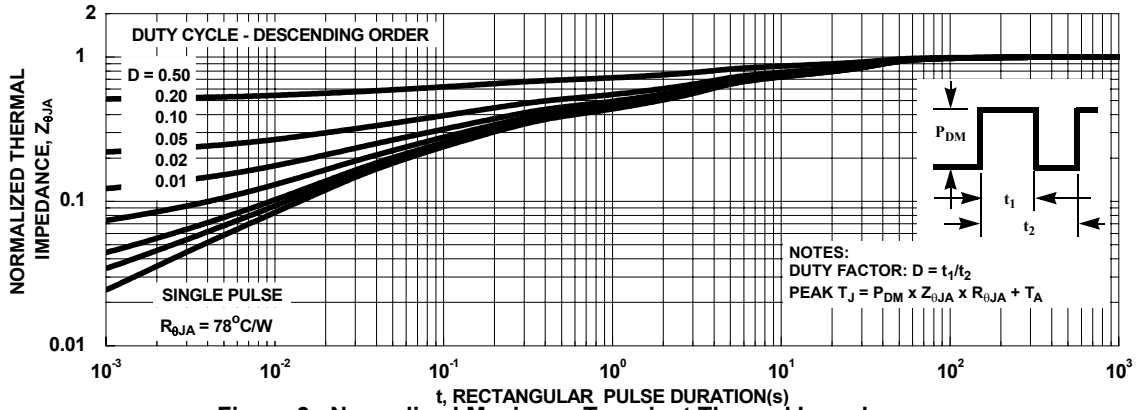


Figure 3. Normalized Maximum Transient Thermal Impedance

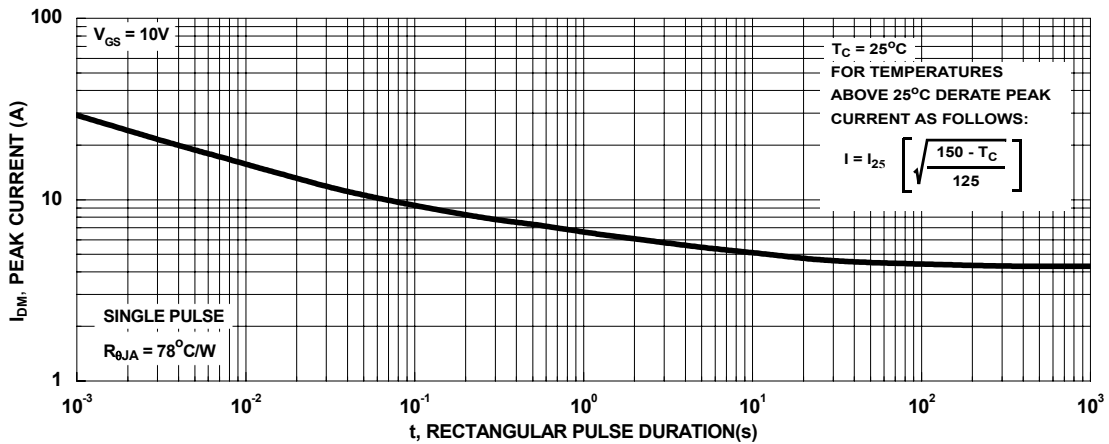


Figure 4. Peak Current Capability

## Typical Characteristics

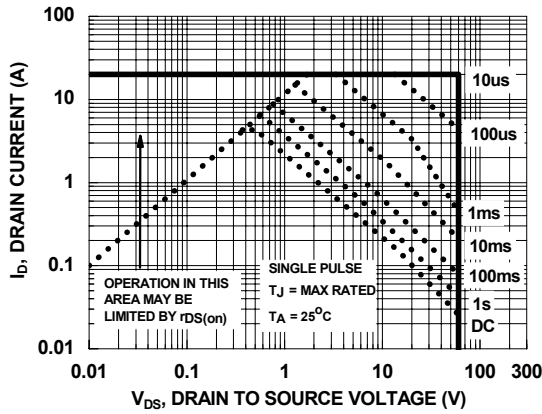


Figure 5. Forward Bias Safe Operating Area

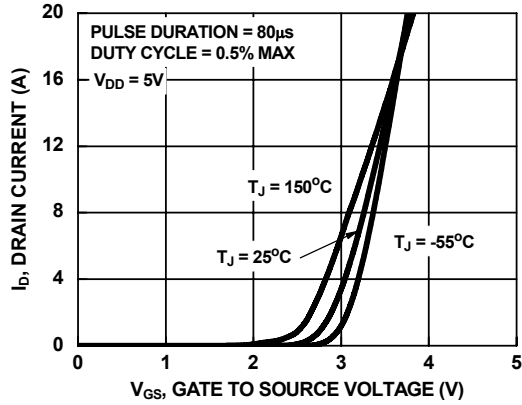


Figure 6. Transfer Characteristics

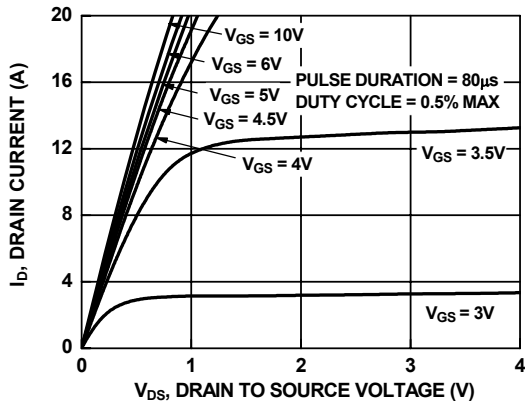


Figure 7. Saturation Characteristics

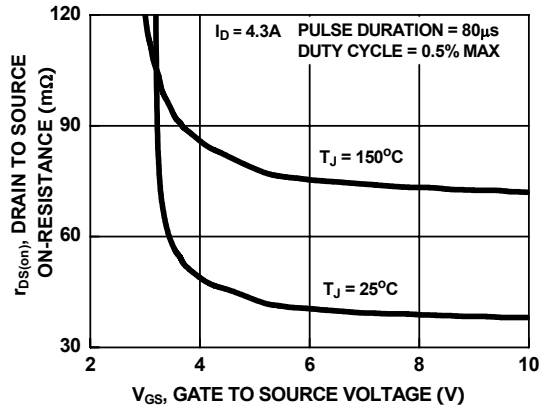


Figure 8. Drain to Source On-Resistance Variation vs Gate to Source Voltage

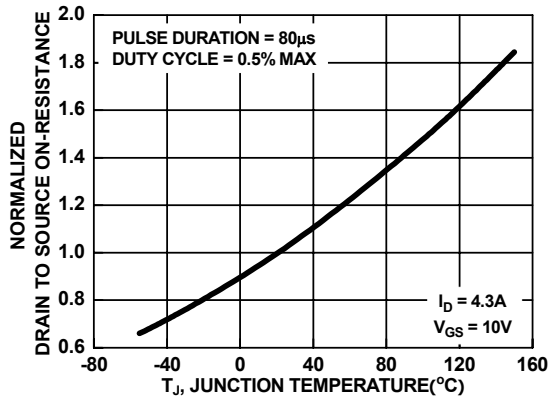


Figure 9. Normalized Drain to Source On-Resistance vs Junction Temperature

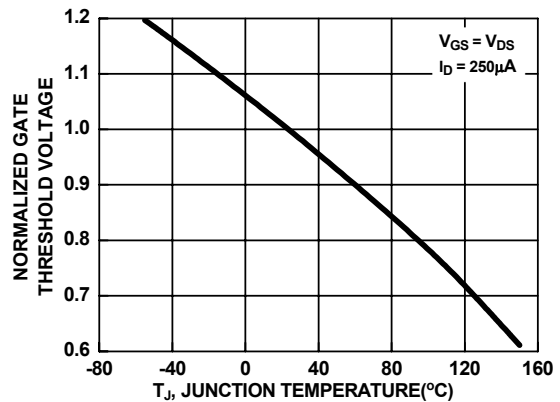


Figure 10. Normalized Gate Threshold Voltage vs Junction Temperature

## Typical Characteristics

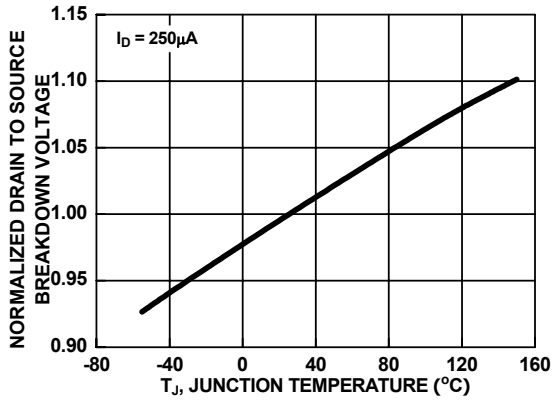


Figure 11. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

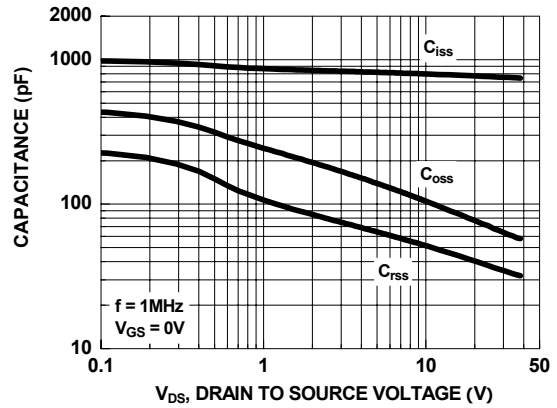


Figure 12. Capacitance vs Drain to Source Voltage

Figure 14.

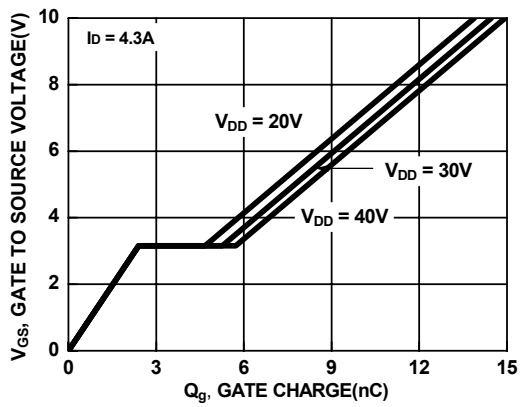







Figure 13. Gate Charge vs Gate to Source Voltage



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