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# FDC855N

## Single N-Channel, Logic Level, PowerTrench® MOSFET 30V, 6.1A, 27mΩ

### Features

- Max  $r_{DS(on)}$  = 27mΩ at  $V_{GS} = 10V$ ,  $I_D = 6.1A$
- Max  $r_{DS(on)}$  = 36mΩ at  $V_{GS} = 4.5V$ ,  $I_D = 5.3A$
- SuperSOT™ -6 package: small footprint (72% smaller than standard SO-8; low profile (1mm thick).
- RoHS Compliant

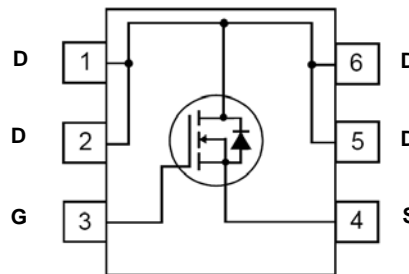
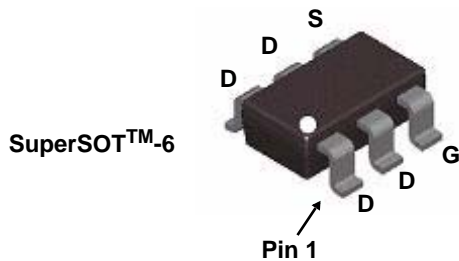


### General Description

This N-Channel Logic Level MOSFET is an efficient solution for low voltage and battery powered applications. Utilizing Fairchild Semiconductor's advanced PowerTrench® process, this device possesses minimized on-state resistance to optimize the power consumption. They are ideal for applications where in-line power loss is critical.

### Application

- Power Management in Notebook, Hard Disk Drive



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

Symbol	Parameter	Rated	Units
$V_{DS}$	Drain to Source Voltage	30	V
$V_{GS}$	Gate to Source Voltage	±20	V
$I_D$	Drain Current -Continuous $T_A = 25^\circ\text{C}$ (Note 1a)	6.1	A
	-Pulsed	20	
$P_D$	Power Dissipation (Steady State) (Note 1a)	1.6	W
	Power Dissipation (Steady State) (Note 1b)	0.8	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	°C

### Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case (Note 1)	30	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	78	

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
.855	FDC855N	SuperSOT-6	7"	8 mm	3000 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$BV_{DSS}$	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$ , referenced to $25^\circ\text{C}$		24		mV/ $^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS} = 0\text{V}, V_{DS} = 24\text{V}$ , $T_C = 125^\circ\text{C}$			1 250	$\mu\text{A}$
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$			$\pm 100$	nA

## On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	1.0	2.0	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$ , referenced to $25^\circ\text{C}$		-6		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{V}, I_D = 6.1\text{A}$		20.7	27.0	m $\Omega$
		$V_{GS} = 4.5\text{V}, I_D = 5.3\text{A}$		28.2	36.0	
		$V_{GS} = 10\text{V}, I_D = 6.1\text{A}, T_J = 125^\circ\text{C}$		30.1	39.3	
$g_{FS}$	Forward Transconductance	$V_{DD} = 10\text{V}, I_D = 6.1\text{A}$		20		S

## Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 15\text{V}, V_{GS} = 0\text{V}$ , $f = 1\text{MHz}$		493	655	pF
$C_{oss}$	Output Capacitance			108	145	pF
$C_{rss}$	Reverse Transfer Capacitance			62	95	pF
$R_g$	Gate Resistance	$f = 1\text{MHz}$		1.0		$\Omega$

## Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 15\text{V}, I_D = 6.1\text{A}$ , $V_{GS} = 10\text{V}, R_{GEN} = 6\Omega$		6	12	ns
$t_r$	Rise Time			2	10	ns
$t_{d(off)}$	Turn-Off Delay Time			14	23	ns
$t_f$	Fall Time			2	10	ns
$Q_g$	Total Gate Charge at 10V		$V_{GS} = 0\text{V to } 10\text{V}$	$V_{DD} = 15\text{V}$ , $I_D = 6.1\text{A}$	9.2	13
$Q_g$	Total Gate Charge at 5V	$V_{GS} = 0\text{V to } 5\text{V}$	4.9		7.0	nC
$Q_{gs}$	Gate to Source Charge		1.7			nC
$Q_{gd}$	Gate to Drain "Miller" Charge		3.1			nC

## Drain-Source Diode Characteristics

$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = 1.3\text{A}$ (Note 2)		0.80	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F = 6.1\text{A}, di/dt = 100\text{A}/\mu\text{s}$		17	31	ns
$Q_{rr}$	Reverse Recovery Charge			6	12	nC

### Notes:

1:  $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.



a.  $78^\circ\text{C/W}$  when mounted on a  $1\text{ in}^2$  pad of 2 oz copper.



b.  $156^\circ\text{C/W}$  when mounted on a minimum pad of 2 oz copper.

2: Pulse Test: Pulse Width < 300  $\mu\text{s}$ , Duty Cycle < 2.0%.

**Typical Characteristics**  $T_J = 25^\circ\text{C}$  unless otherwise noted

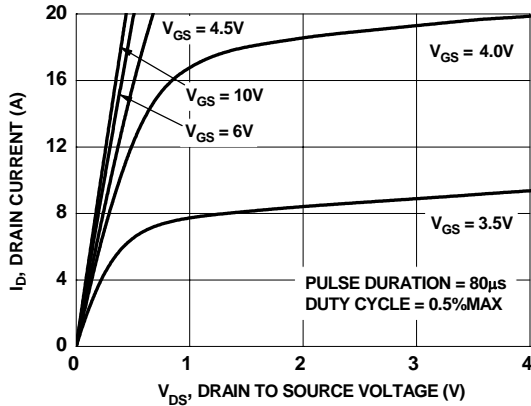


Figure 1. On-Region Characteristics

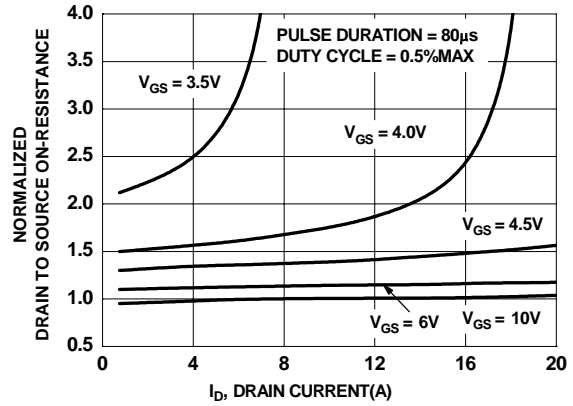


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

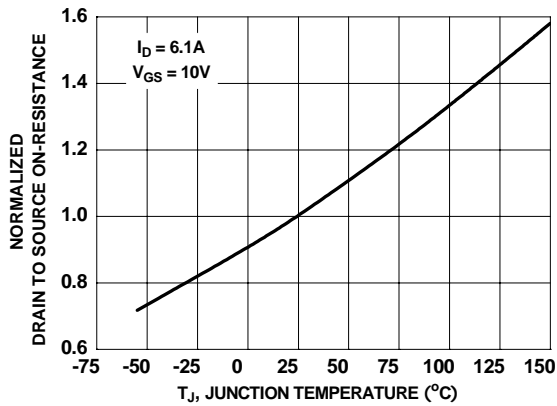


Figure 3. Normalized On-Resistance vs Junction Temperature

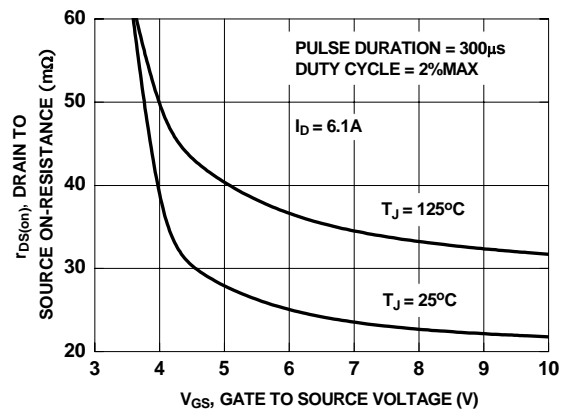


Figure 4. On-Resistance vs Gate to Source Voltage

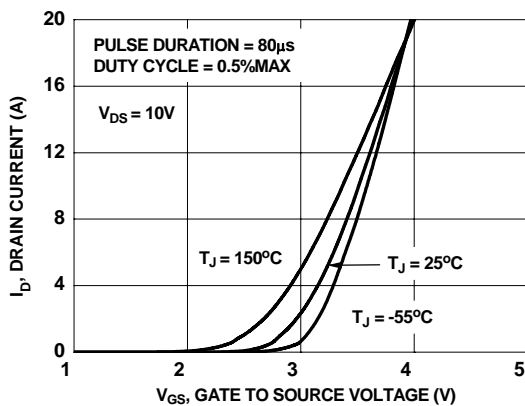


Figure 5. Transfer Characteristics

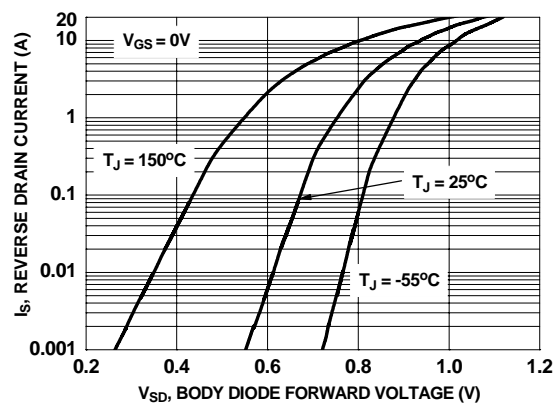
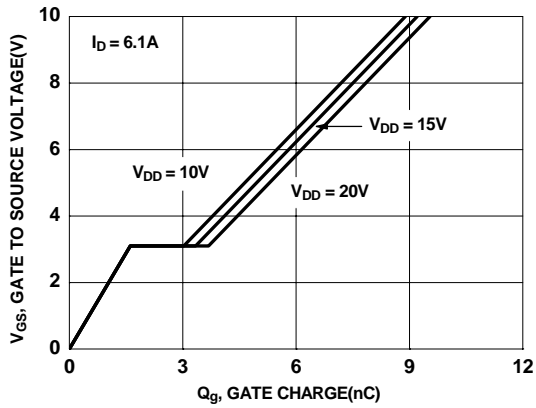
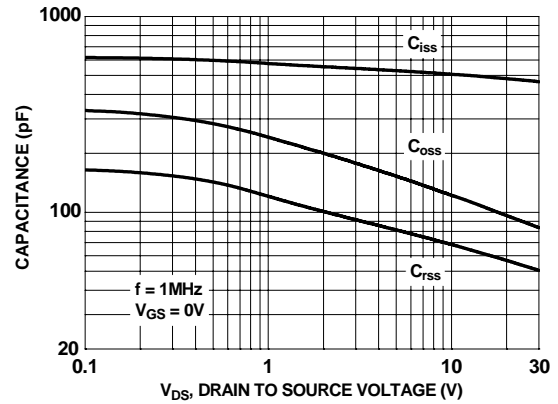


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

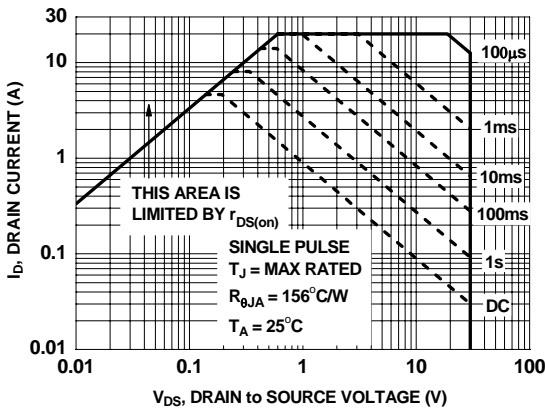
**Typical Characteristics**  $T_J = 25^\circ\text{C}$  unless otherwise noted



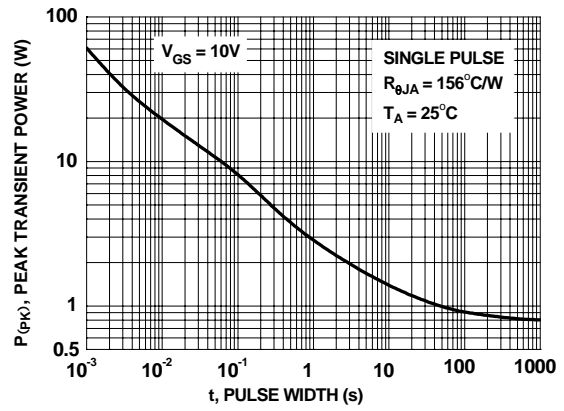
**Figure 7. Gate Charge Characteristics**



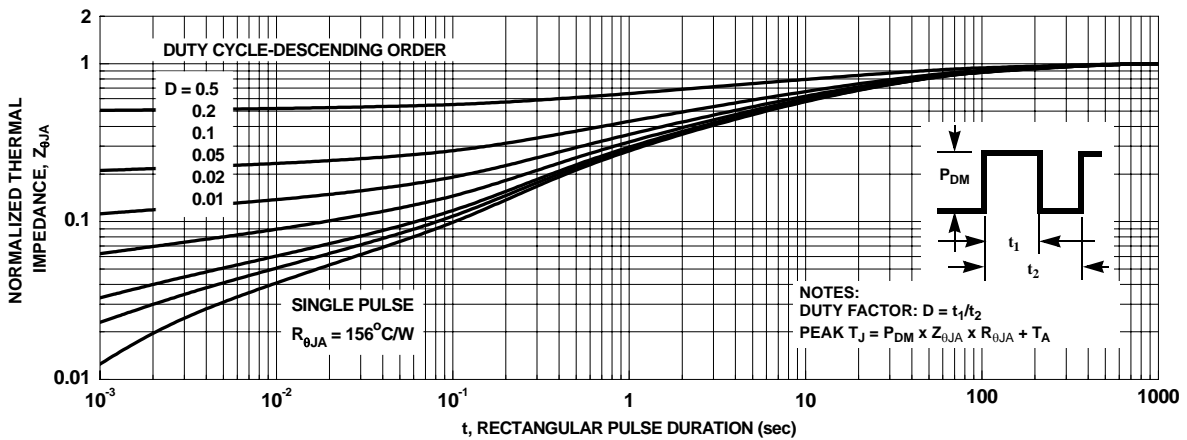
**Figure 8. Capacitance vs Drain to Source Voltage**



**Figure 9. Forward Bias Safe Operating Area**

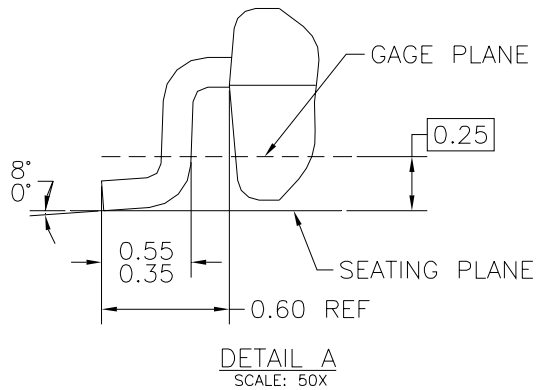
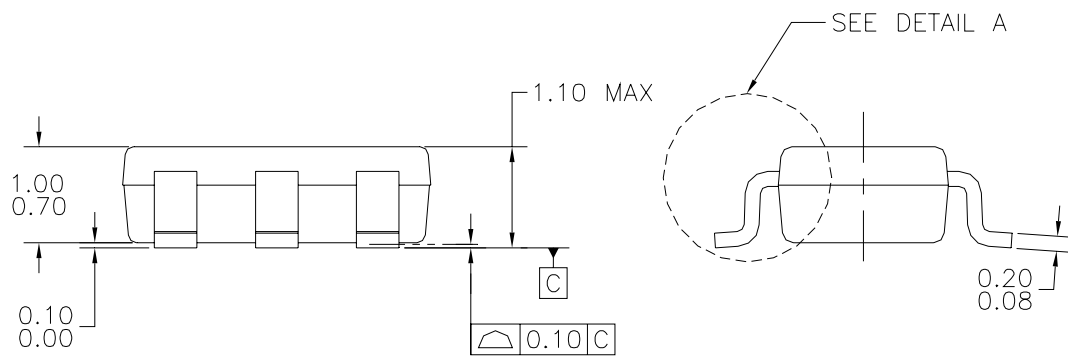
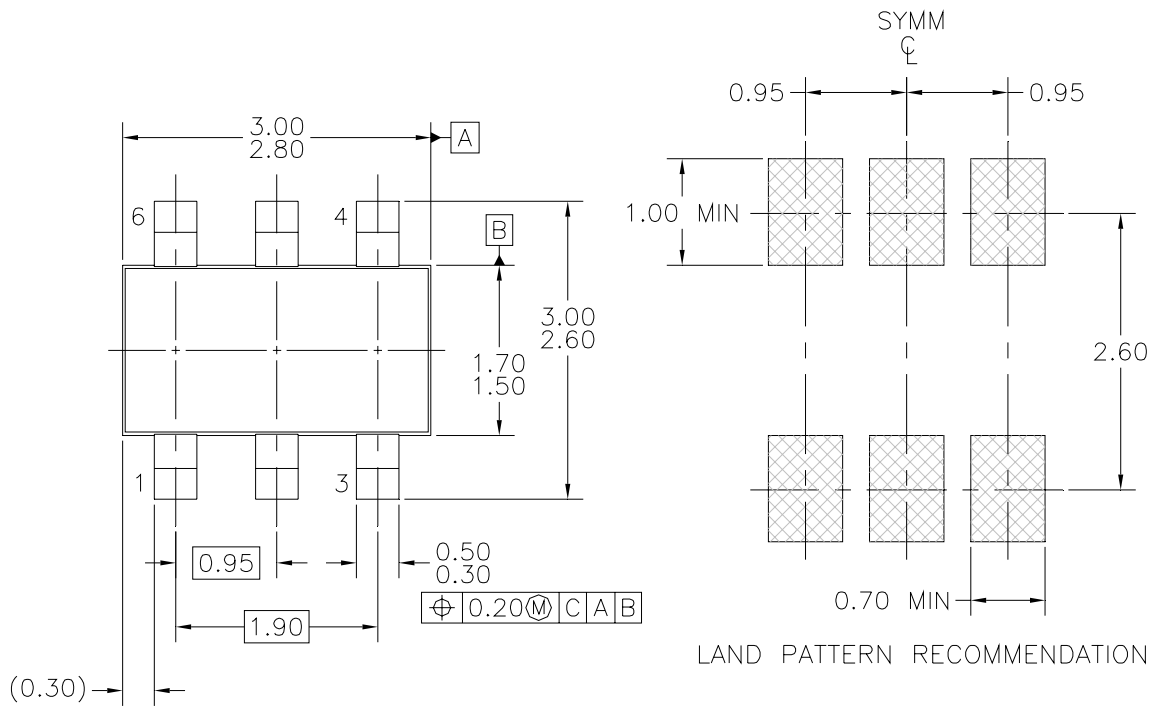


**Figure 10. Single Pulse Maximum Power Dissipation**



**Figure 11. Transient Thermal Response Curve**

### Dimensional Outline and Pad Layout



NOTES: UNLESS OTHERWISE SPECIFIED

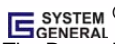



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