ON Semiconductor®

FDC6561AN

Dual N-Channel Logic Level PowerTrench™ MOSFET

General Description

These N-Channel Logic Level MOSFETs are produced using ON Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain low gate charge for superior switching performance.

These devices are well suited for all applications where small size is desireable but especially low cost DC/DC conversion in battery powered systems.

Features

- 2.5 A, 30 V. $R_{DS(ON)} = 0.095 \ \Omega$ @ $V_{GS} = 10$ V
  $R_{DS(ON)} = 0.145 \ \Omega$ @ $V_{GS} = 4.5$ V

- Very fast switching.

- Low gate charge (2.1nC typical).

- SuperSOT™-6 package: small footprint (72% smaller than standard SO-8); low profile (1mm thick).

SOT-23	SuperSOT™-6	SuperSOT™-8	SO-8	SOT-223	SOIC-16

SuperSOT™-6
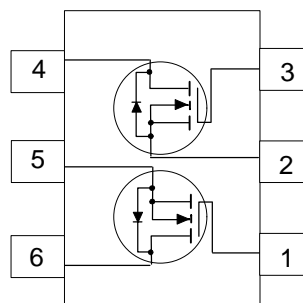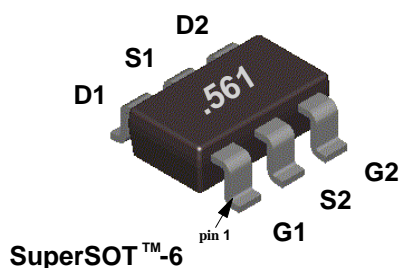
Absolute Maximum Ratings $T_A = 25°C$ unless otherwise note

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain-Source Voltage		30	V
V_{GSS}	Gate-Source Voltage - Continuous		±20	V
I_D	Drain Current - Continuous		2.5	A
	- Pulsed		10	
P_D	Maximum Power Dissipation	(Note 1a)	0.96	W
		(Note 1b)	0.9	
		(Note 1c)	0.7	
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to 150	°C
THERMAL CHARACTERISTICS				
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1a)		130	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Note 1)		60	°C/W

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ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

| Symbol	Parameter	Conditions		Min	Typ	Max	Units
OFF CHARACTERISTICS							
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 µA		30			V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	I_D = 250 µA, Referenced to 25 °C			23.6		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24 V, V_{GS} = 0 V				1	µA
			T_J = 55 °C			10	µA
I_{GSSF}	Gate - Body Leakage, Forward	V_{GS} = 20 V, V_{DS} = 0 V				100	nA
I_{GSSR}	Gate - Body Leakage, Reverse	V_{GS} = -20 V, V_{DS} = 0 V				-100	nA
ON CHARACTERISTICS (Note 2)							
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 µA		1	1.8	3	V
$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold VoltageTemp.Coefficient	I_D = 250 µA, Referenced to 25 °C			-4		mV/°C
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 2.5 A			0.082	0.095	Ω
			T_J = 125 °C		0.122	0.152	
		V_{GS} = 4.5 V, I_D = 2.0 A			0.113	0.145	
$I_{D(on)}$	On-State Drain Current	V_{GS} = 10 V, V_{DS} = 5 V		10			A
g_{FS}	Forward Transconductance	V_{DS} = 5 V, I_D = 2.5 A			5		S
DYNAMIC CHARACTERISTICS							
C_{iss}	Input Capacitance	V_{DS} = 15 V, V_{GS} = 0 V,			220		pF
C_{oss}	Output Capacitance	f = 1.0 MHz			50		pF
C_{rss}	Reverse Transfer Capacitance				25		pF
SWITCHING CHARACTERISTICS (Note 2)							
$t_{D(on)}$	Turn - On Delay Time	V_{DD} = 5 V, I_D = 1 A,			6	12	ns
t_r	Turn - On Rise Time	V_{GS} = 10 V, R_{GEN} = 6 Ω			10	18	ns
$t_{D(off)}$	Turn - Off Delay Time				12	22	ns
t_f	Turn - Off Fall Time				2	6	ns
Q_g	Total Gate Charge	V_{DS} = 15 V, I_D = 2.5 A			2.3	3.2	nC
Q_{gs}	Gate-Source Charge	V_{GS} = 5 V			0.7	1	nC
Q_{gd}	Gate-Drain Charge				0.9	1.3	nC
DRAIN-SOURCE DIODE CHARACTERISTICS							
I_S	Continuous Source Diode Current					0.75	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 0.75 A (Note 2)			0.78	1.2	V

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.
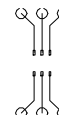
2. Pulse Test: Pulse Width $\leq$ 300µs, Duty Cycle $\leq$ 2.0%.
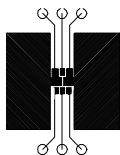
a. 130°C/W on a 0.125 in^2 pad of 2oz copper.
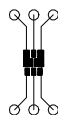
b. 140°C/W on a 0.005 in^2 pad of 2oz copper.

c. 180°C/W on a minimum pad.
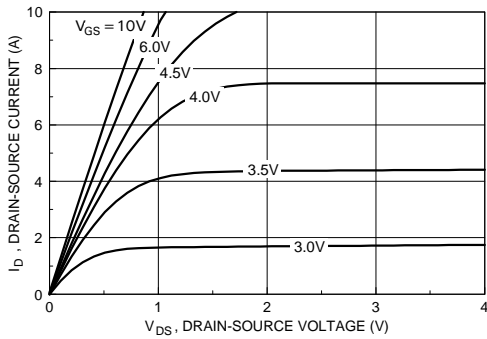
Typical Electrical Characteristics

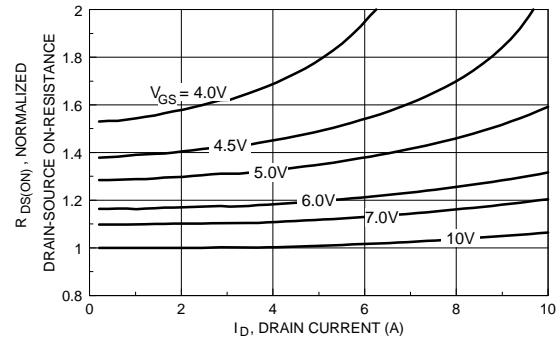Figure 1. On-Region Characteristics.

Figure 2. On-Resistance Variation with
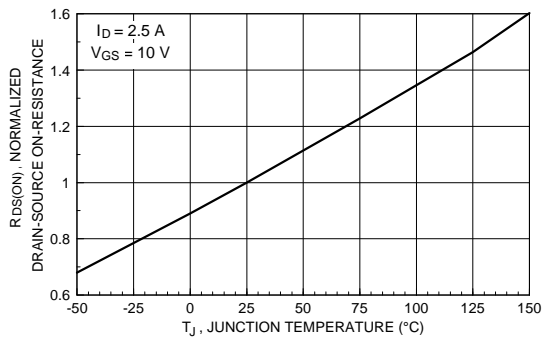Drain Current and Gate Voltage.
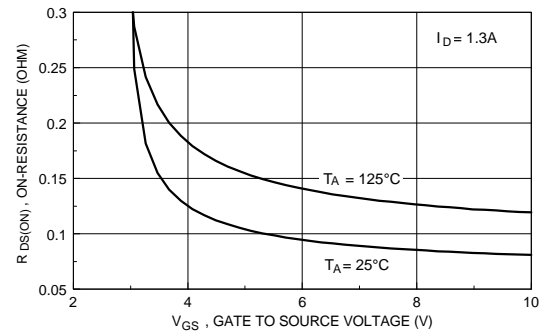

Figure 3. On-Resistance Variation
with Temperature.

Figure 4. On-Resistance Variation with
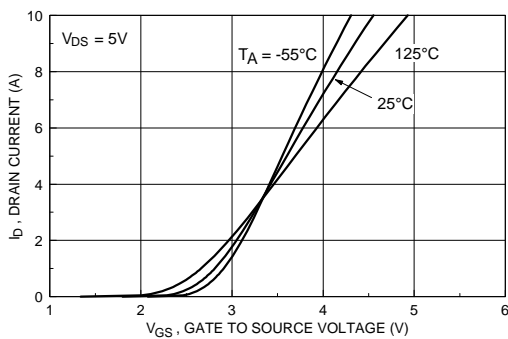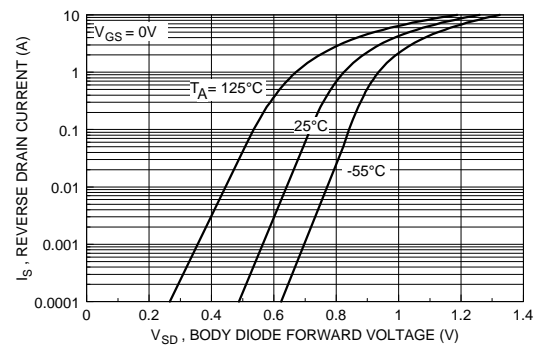Gate-to-Source Voltage.

Figure 5.Transfer Characteristics.

Figure 6. Body Diode Forward Voltage
Variation with Source Current
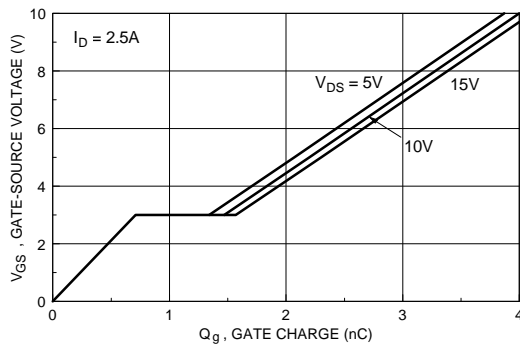and Temperature.

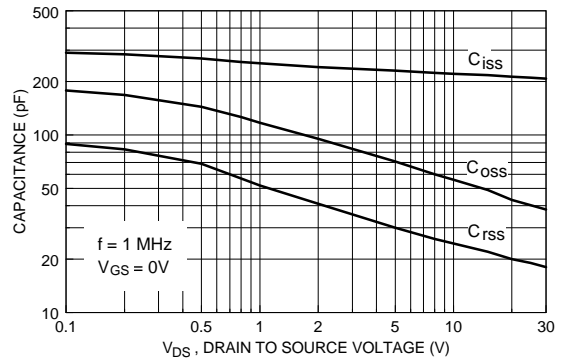# Typical Electrical Characteristics (continued)

Figure 7. Gate Charge Characteristics.

Figure 8. Capacitance Characteristics.
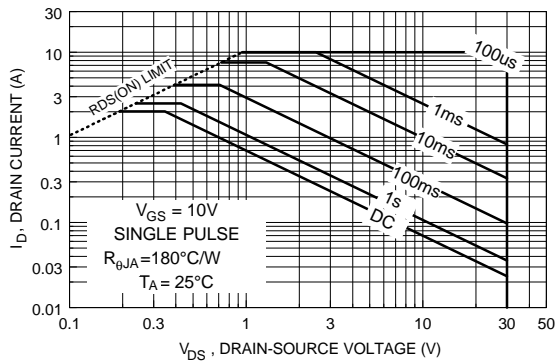
Figure 9. Maximum Safe Operating Area.
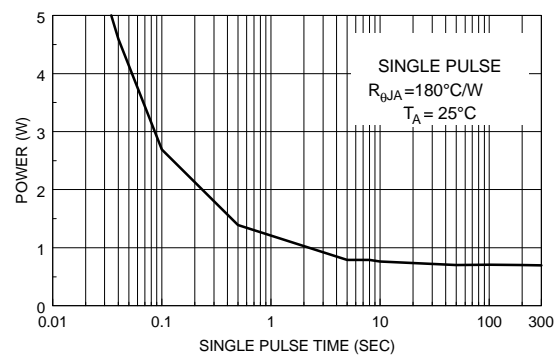
Figure 10. Single Pulse Maximum Power Dissipation.
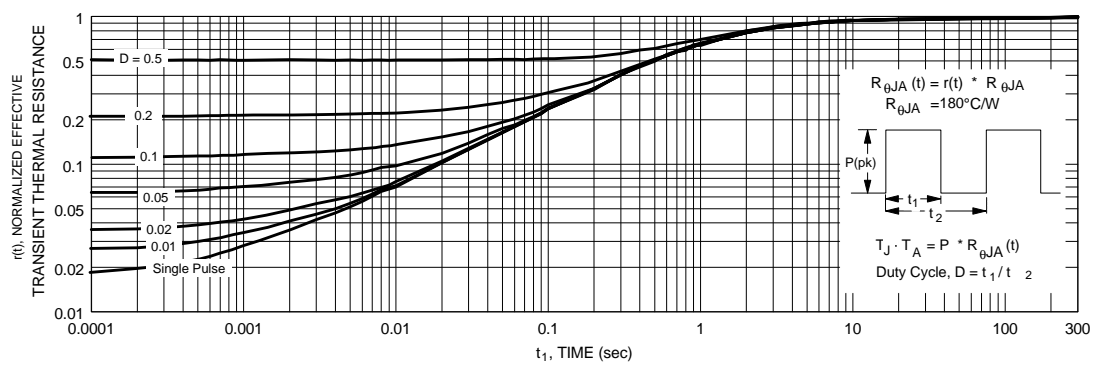
Figure 11. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 1c.

Transient thermal response will change depending on the circuit board design.

PUBLICATION ORDERING INFORMATION

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