Si4822DY
# Single N-Channel, Logic Level, PowerTrench MOSFET

GeneralDescription

This N-Channel Logic Level MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.
These devices are well suited for low voltage and battery powered applications where low in-line power loss and fast switching are required.

Features

- 12.5 A, 30 V. $R_{DS(ON)} = 0.0095\ \Omega$ @ $V_{GS} = 10$ V
  $R_{DS(ON)} = 0.013\ \Omega$ @ $V_{GS} = 4.5$ V.

- Fast switching speed.

- Low gate charge.

- High performance trench technology for extremely low $R_{DS(ON)}$.

- High power and current handling capability.

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

SO-8   pin 1
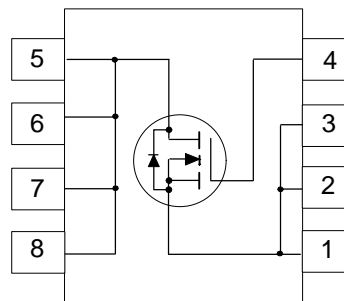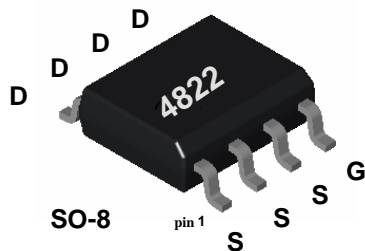
Absolute Maximum Ratings $T_A = 25^{\circ}C$ unless other wise noted

| Symbol	Parameter		Si4822DY	Units
V_{DSS}	Drain-Source Voltage		30	V
V_{GSS}	Gate-Source Voltage		±20	V
I_D	Drain Current - Continuous	(Note 1a)	12.5	A
	- Pulsed		50	
P_D	Power Dissipation for Single Operation	(Note 1a)	2.5	W
		(Note 1b)	1.2	
		(Note 1c)	1	
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)		50	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Note 1)		25	°C/W

Electrical Characteristics ($T_A = 25\,^{\circ}C$ unless otherwise noted)

| Symbol	Parameter	Conditions		Min	Typ	Max	Units
OFF CHARACTERISTICS							
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0$ V, $I_D = 250\ \mu A$		30			V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	$I_D = 250\ \mu A$, Referenced to $25\,^{\circ}C$			33		mV / $^{\circ}C$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 24$ V, $V_{GS} = 0$ V				1	μA
			$T_J = 55^{\circ}C$			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)							
$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold Voltage Temp. Coefficient	$I_D = 250\ \mu A$, Referenced to $25\,^{\circ}C$			-4.5		mV /$^{\circ}C$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250\ \mu A$		1	1.6	3	V
			$T_J = 125^{\circ}C$	0.8	1.3	2.4	
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = 10$ V, $I_D = 12.5$ A			0.008	0.0095	Ω
			$T_J = 125^{\circ}C$		0.012	0.016	
		$V_{GS} = 4.5$ V, $I_D = 10.5$ A			0.0105	0.013	
$I_{D(ON)}$	On-State Drain Current	$V_{GS} = 10$ V, $V_{DS} = 5$ V		25			A
g_{FS}	Forward Transconductance	$V_{DS} = 15$ V, $I_D = 12.5$ A			35		S
DYNAMIC CHARACTERISTICS							
C_{iss}	Input Capacitance	$V_{DS} = 15$ V, $V_{GS} = 0$ V, f = 1.0 MHz			2180		pF
C_{oss}	Output Capacitance				500		pF
C_{rss}	Reverse Transfer Capacitance				255		pF
SWITCHING CHARACTERISTICS (Note 2)							
$t_{D(on)}$	Turn - On Delay Time	$V_{DS} = 10$ V, $I_D = 1$ A			13	24	ns
t_r	Turn - On Rise Time	$V_{GS} = 10$ V , $R_{GEN} = 6\,\Omega$			14	26	ns
$t_{D(off)}$	Turn - Off Delay Time				43	70	ns
t_f	Turn - Off Fall Time				15	27	ns
Q_g	Total Gate Charge	$V_{DS} = 15$ V, $I_D = 12.5$ A, $V_{GS} = 5$ V			23	33	nC
Q_{gs}	Gate-Source Charge				7		nC
Q_{gd}	Gate-Drain Charge				11		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
I_S	Maximum Continuous Drain-Source Diode Forward Current					2.1	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0$ V, $I_S = 2.1$ A (Note 2)			0.72	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.
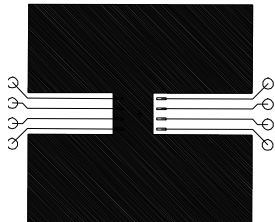
a. $50^{\circ}C/W$ on a 1 in^2 pad of 2oz copper.
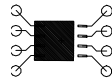
b. $105^{\circ}C/W$ on a 0.04 in^2 pad of 2oz copper.
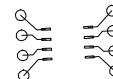
c. $125^{\circ}C/W$ on a 0.006 in^2 pad of 2oz copper.

Scale 1 : 1 on letter size paper

2. Pulse Test: Pulse Width $\leq$ 300µs, Duty Cycle $\leq$ 2.0%.
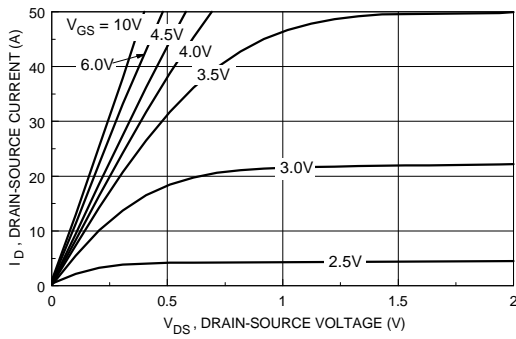
Typical Electrical Characteristics

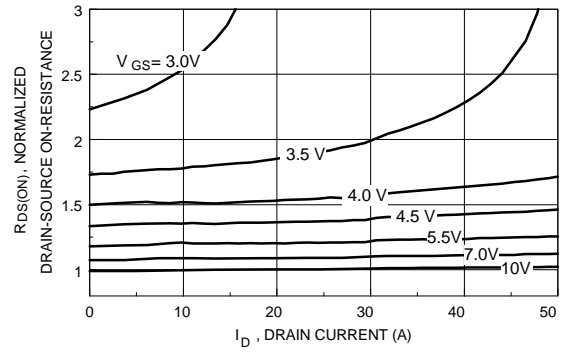**Figure 1. On-Region Characteristics**.

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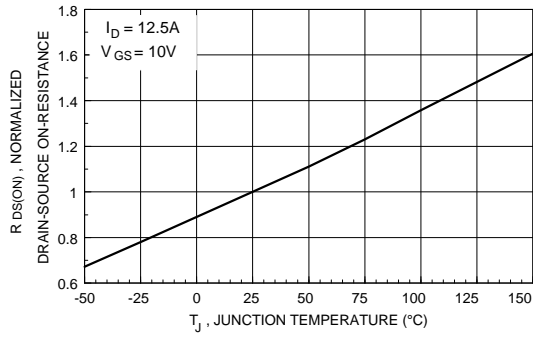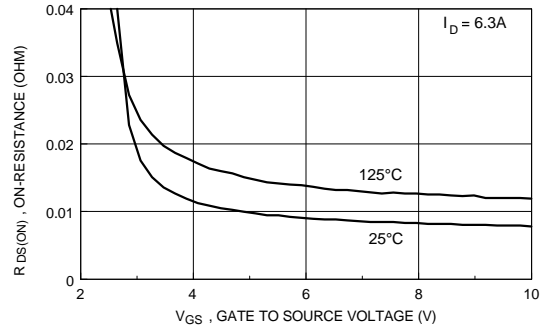

Figure 3. On-Resistance Variation with Temperature.

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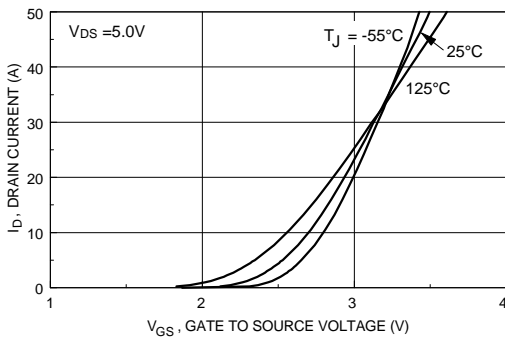

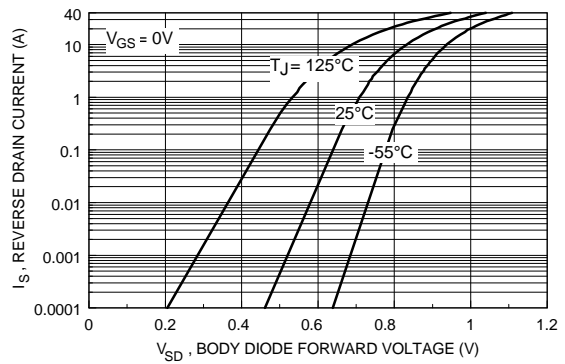
Figure 5 . Transfer Characteristics.

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

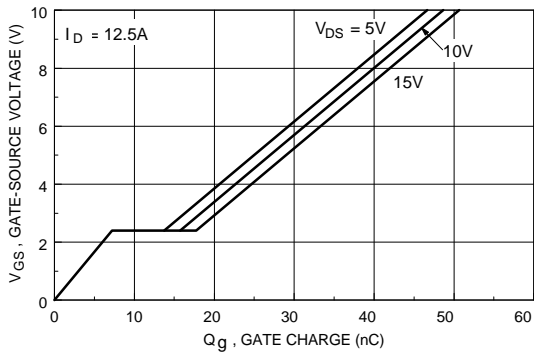# Typical Electrical And Thermal Characteristics

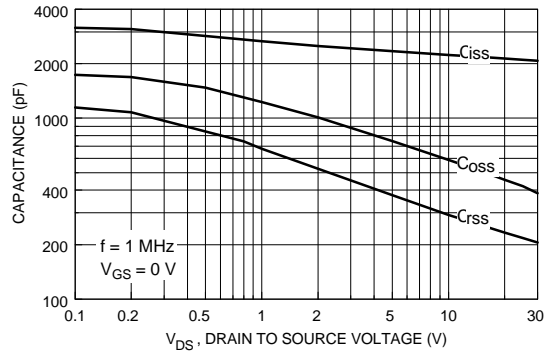
Figure 7. Gate Charge Characteristics.

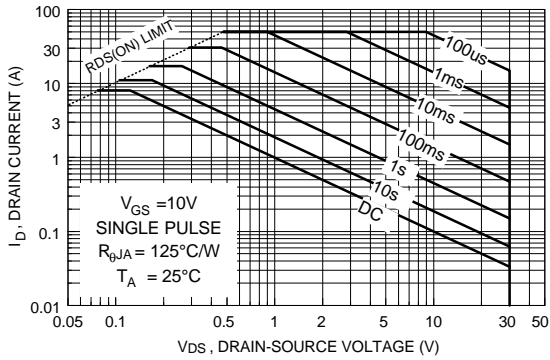Figure 8. Capacitance Characteristics.
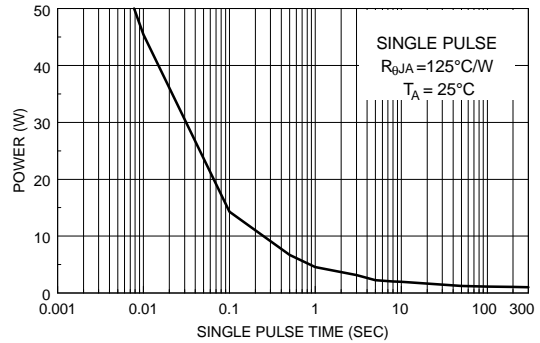

Figure 9. Maximum Safe Operating Area.

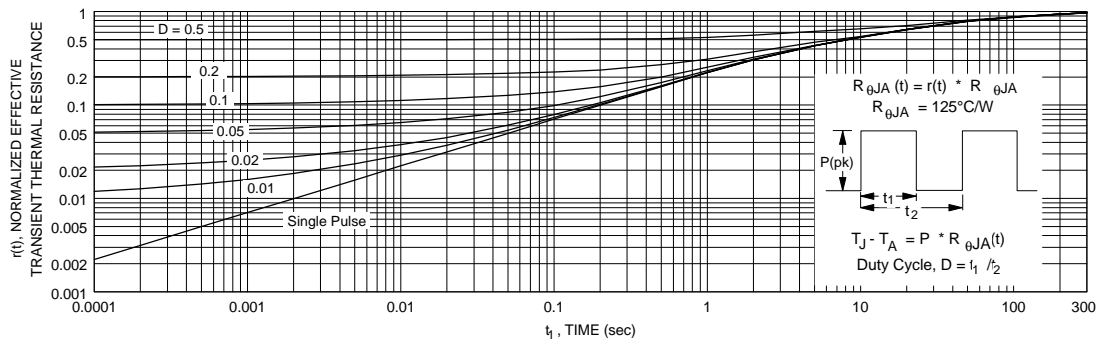Figure 10. Single Pulse Maximum Power Dissipation.

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.

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EnSigna™	OPTOLOGIC™	SMART START™	
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