

FDP2710 250V N-Channel PowerTrench MOSFET

General Description

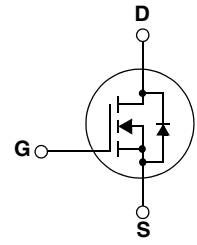
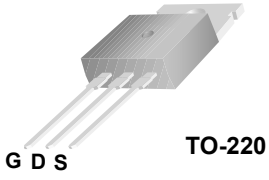
This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Description

- 50A, 250V, $R_{DS(on)} = 36.3m\Omega @ V_{GS} = 10V$
- Fast switching speed
- Low gate charge
- High performance trench technology for extremely low $R_{DS(on)}$
- High power and current handling capability
- RoHS compliant

Application

- PDP application



Absolute Maximum Ratings

Symbol	Parameter	Ratings	Unit
V_{DS}	Drain-Source Voltage	250	V
V_{GS}	Gate-Source voltage	± 30	V
I_D	Drain Current	- Continuous ($T_C = 25^\circ C$)	50
		- Continuous ($T_C = 100^\circ C$)	31.3
I_{DM}	Drain Current - Pulsed (Note 1)	See Figure 9	A
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	145	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5	V/ns
P_D	Power Dissipation ($T_C = 25^\circ C$)	- Derate above 25°C	260
			2.1
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ C$
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds	300	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Min	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	--	0.48	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	62.5	$^\circ C/W$

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP2710	FDP2710	TO-220	-	-	50

Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA, T _J = 25°C	250	--	--	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I _D = 250μA, Referenced to 25°C	--	0.25	--	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 250V, V _{GS} = 0V V _{DS} = 250V, V _{GS} = 0V, T _C = 125°C	--	--	10 500	μA μA
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 30V, V _{DS} = 0V	--	--	100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -30V, V _{DS} = 0V	--	--	-100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	3.0	4.0	5.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10V, I _D = 25A	--	36.3	42.5	mΩ
g _{FS}	Forward Transconductance	V _{DS} = 10V, I _D = 25A (Note 4)	--	63	--	S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 25V, V _{GS} = 0V, f = 1.0MHz	--	5470	7280	pF
C _{oss}	Output Capacitance		--	426	570	pF
C _{rss}	Reverse Transfer Capacitance		--	97	146	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = 125V, I _D = 50A V _{GS} = 10V, R _{GEN} = 25Ω (Note 4, 5)	--	80	170	ns
t _r	Turn-On Rise Time		--	252	515	ns
t _{d(off)}	Turn-Off Delay Time		--	112	235	ns
t _f	Turn-Off Fall Time		--	154	320	ns
Q _g	Total Gate Charge	V _{DS} = 125V, I _D = 50A V _{GS} = 10V (Note 4, 5)	--	78	101	nC
Q _{gs}	Gate-Source Charge		--	34	--	nC
Q _{gd}	Gate-Drain Charge		--	18	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current		--	--	50	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	150	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0V, I _S = 50A	--	--	1.2	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0V, I _S = 50A	--	163	--	ns
Q _{rr}	Reverse Recovery Charge	dI _F /dt = 100A/μs (Note 4)	--	1.3	--	μC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L = 1mH, I_{AS} = 17A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3. I_{SD} ≤ 50A, di/dt ≤ 100A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 2%
5. Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

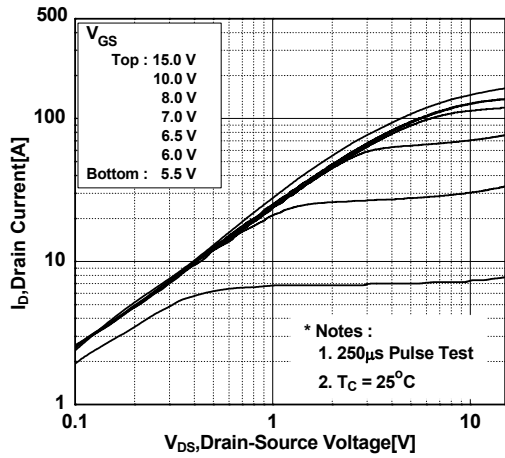


Figure 2. Transfer Characteristics

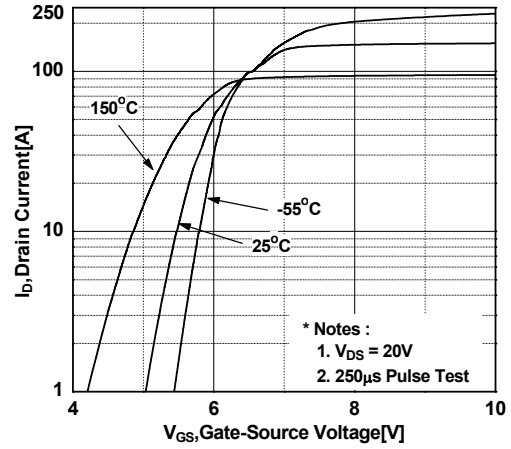


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

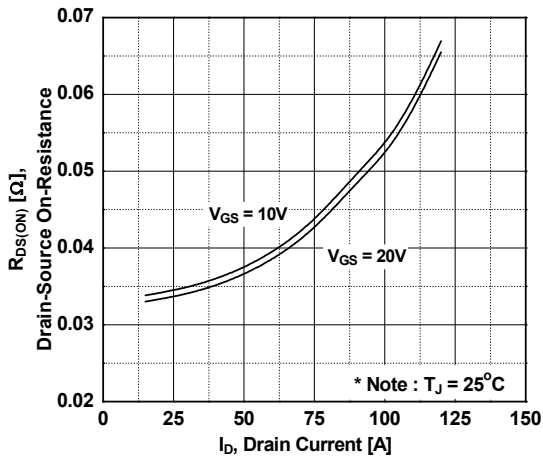


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

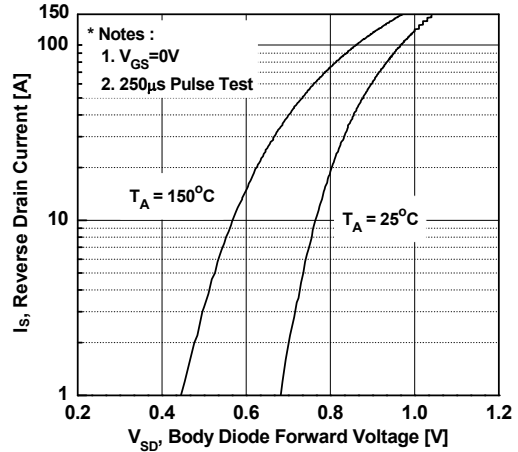


Figure 5. Capacitance Characteristics

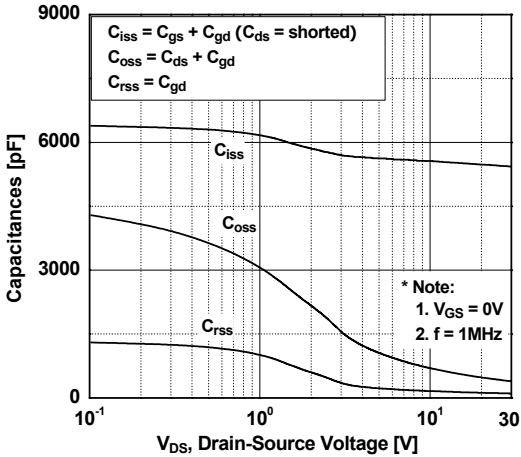
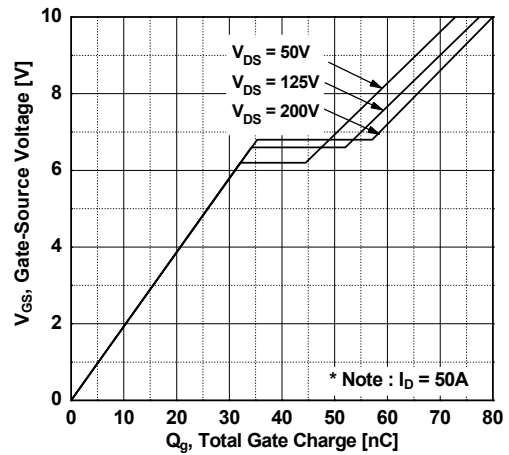


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

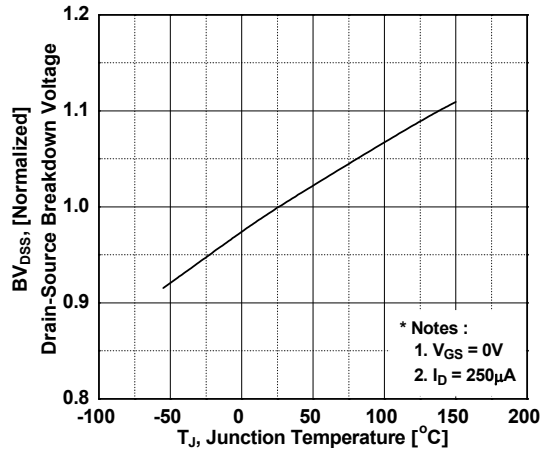


Figure 8. On-Resistance Variation vs. Temperature

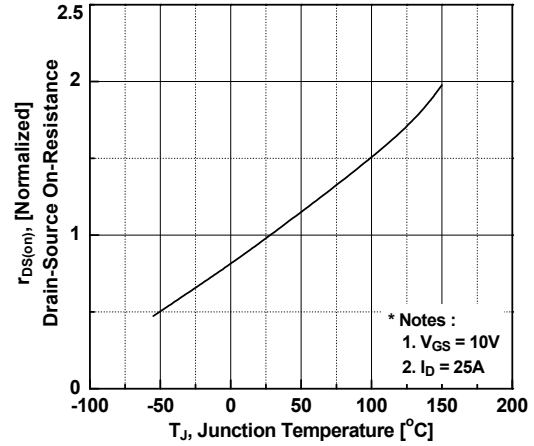


Figure 9. Maximum Safe Operating Area

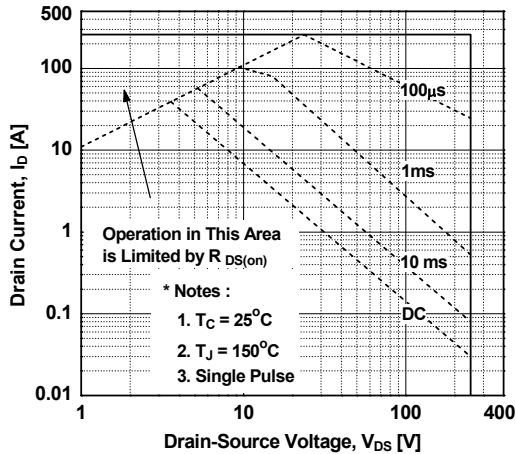


Figure 10. Maximum Drain Current vs. Case Temperature

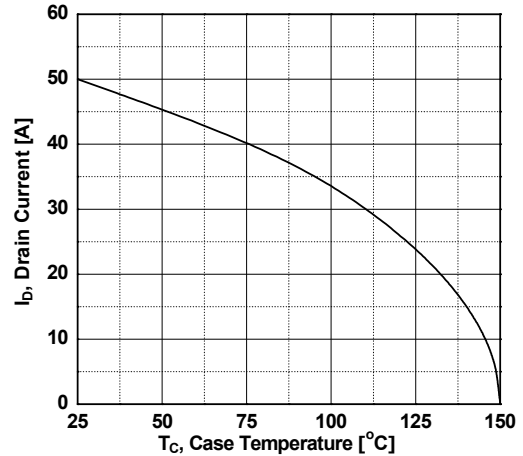
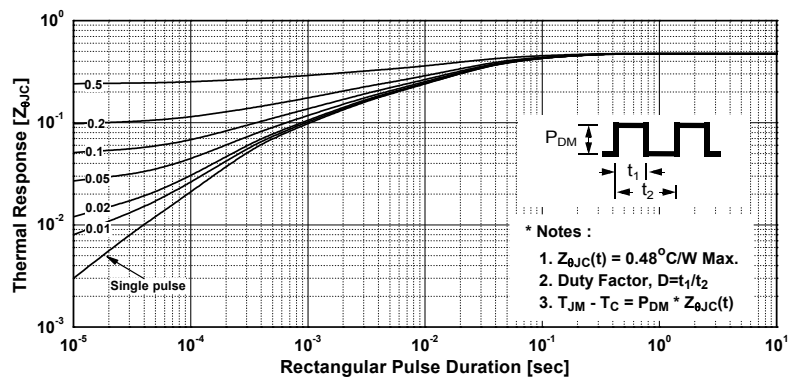
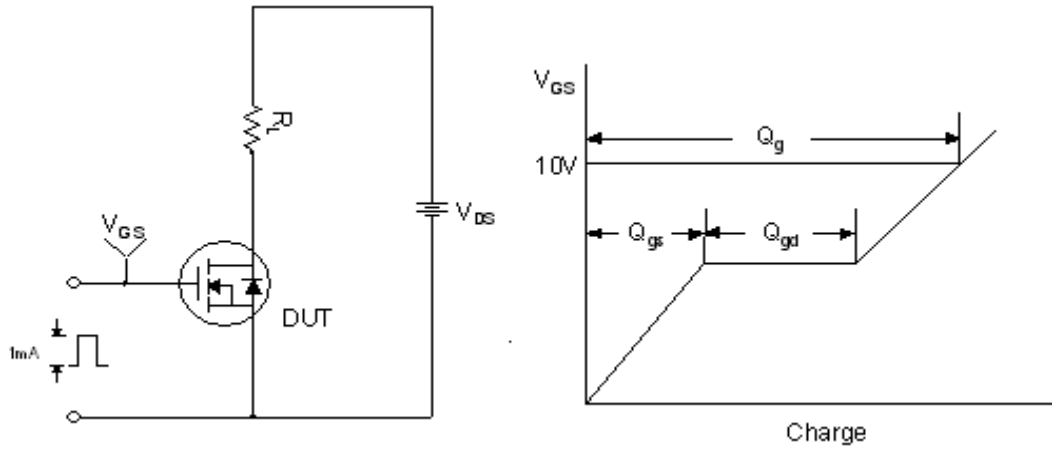


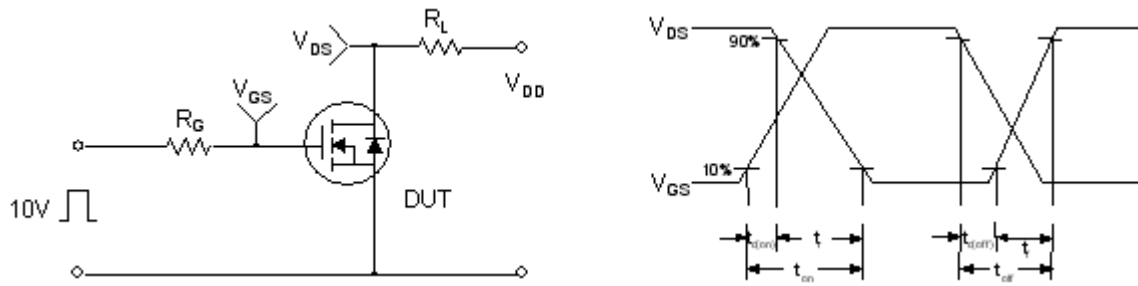
Figure 11. Transient Thermal Response Curve



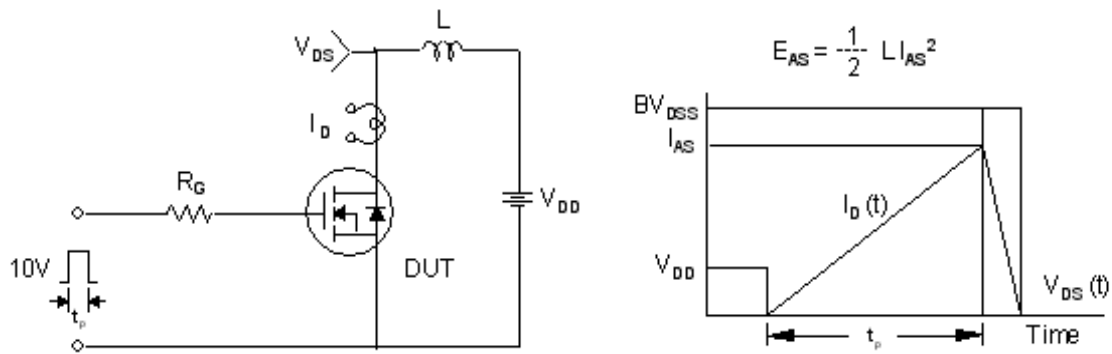
Gate Charge Test Circuit & Waveform



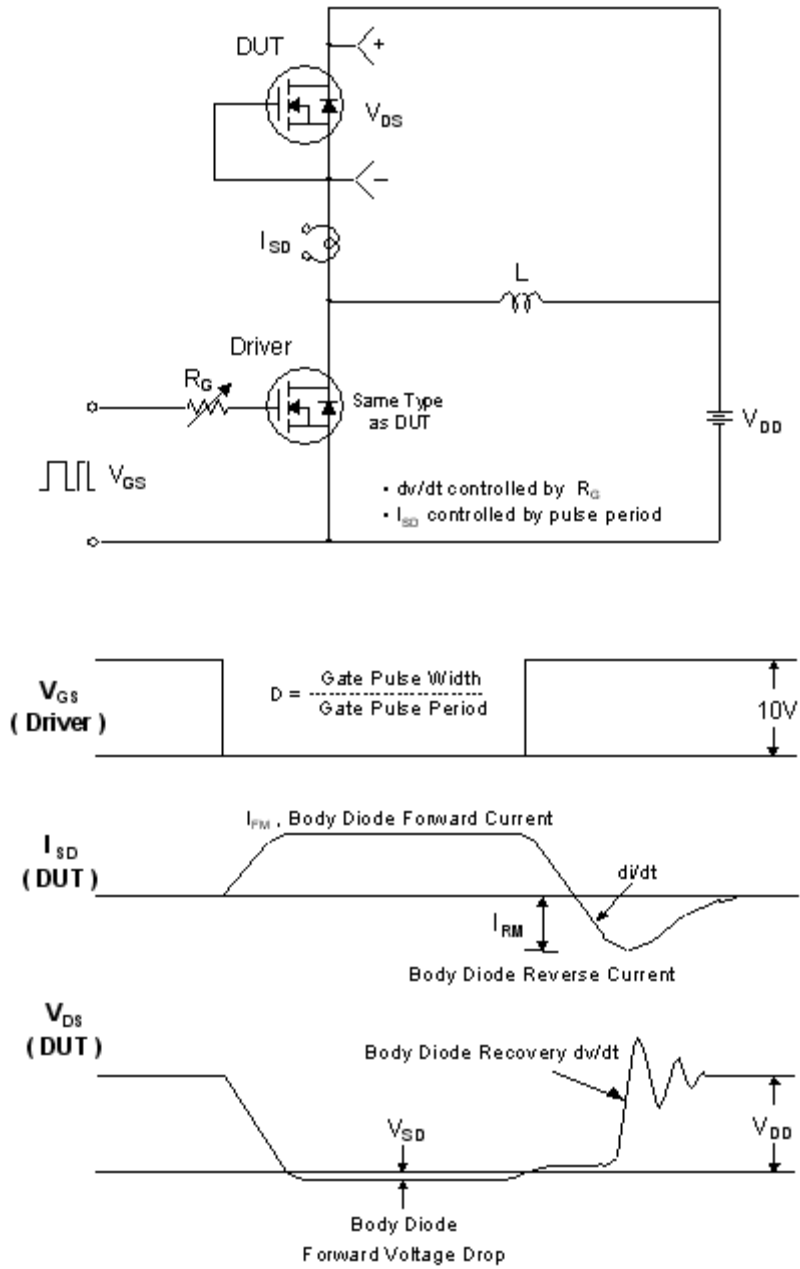
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms




Peak Diode Recovery dv/dt Test Circuit & Waveforms





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