

## FDP054N10 N-Channel PowerTrench<sup>®</sup> MOSFET 100 V, 144 A, 5.5 m $\Omega$

## Features

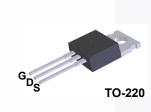
- $R_{DS(on)}$  = 4.6 m $\Omega$  (Typ.) @ V<sub>GS</sub> = 10 V, I<sub>D</sub> = 75 A
- · Fast Switching Speed
- Low Gate Charge
- High Performance Trench Technology for Extremely Low  $R_{\text{DS}(\text{on})}$
- High Power and Current Handling Capability
- RoHS Compliant

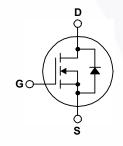
## Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench<sup>®</sup> process that has been tailored to minimize the on-state resistance while maintaining superior switching performance.

## Applications

- Synchronous Rectification for ATX / Server / Telecom PSU
- Battery Protection Circuit
- Motor Drives and Uninterruptible Power Supplies
- Micro Solar Inverter





## MOSFET Maximum Ratings T<sub>C</sub> = 25°C unless otherwise noted.

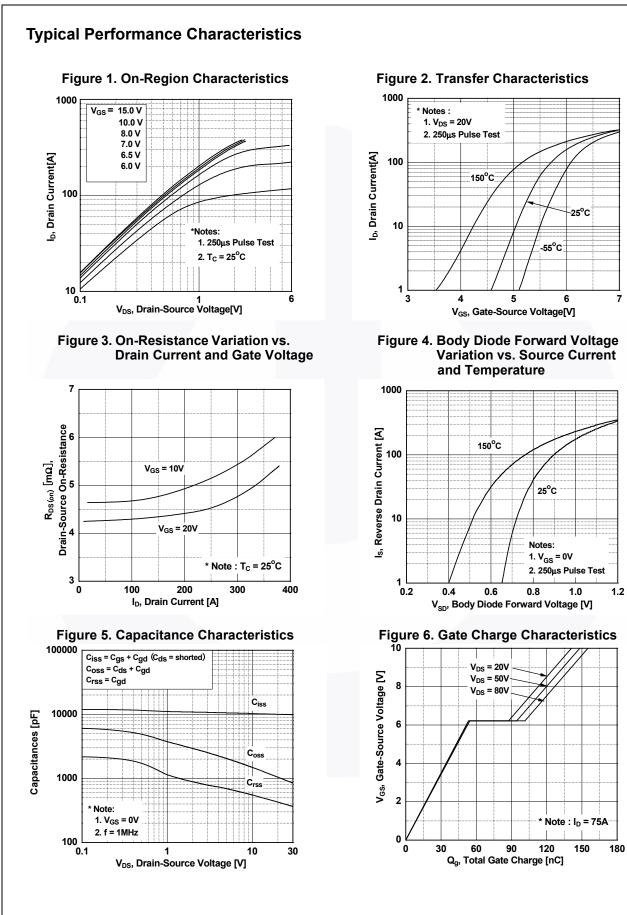
Symbol		Parameter	FDP054N10	Unit	
V <sub>DSS</sub>	Drain to Source Voltage		100	V	
V <sub>GSS</sub>	Gate to Source Voltage		±20	V	
ID		- Continuous (T <sub>C</sub> = 25°C, Silicon Limit	ed) 144		
	Drain Current	- Continuous (T <sub>C</sub> = 100°C, Silicon Lim	ited) 102	A	
		- Continuous (T <sub>C</sub> = 25°C, Package Lin	nited) 120		
I <sub>DM</sub>	Drain Current	- Pulsed (N	ote 1) 576	А	
E <sub>AS</sub>	Single Pulsed Avalanche Energy (Note 2)		ote 2) 1153	mJ	
dv/dt	Peak Diode Avalanche Energy (Note 3)		ote 3) 6	V/ns	
P <sub>D</sub>	Dower Dissinction	(T <sub>C</sub> = 25 <sup>o</sup> C)	263	W	
	Power Dissipation	- Derate Above 25°C	1.75	W/ºC	
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range		-55 to +175	°C	
TL	Maximum Lead Temperatu	ure for Soldering, 1/8" from Case for 5 Second	ls 300	°C	

## **Thermal Characteristics**

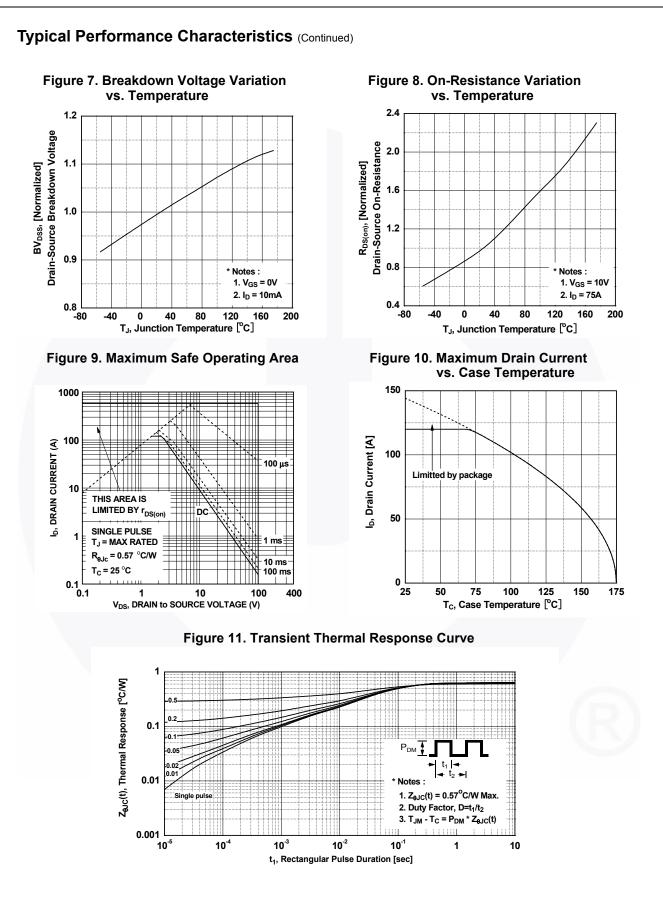
Symbol	Parameter FDP054N1		Unit
$R_{ extsf{ heta}JC}$	Thermal Resistance, Junction to Case, Max.	0.57	°C/W
$R_{ extsf{ heta}JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	°C/vv

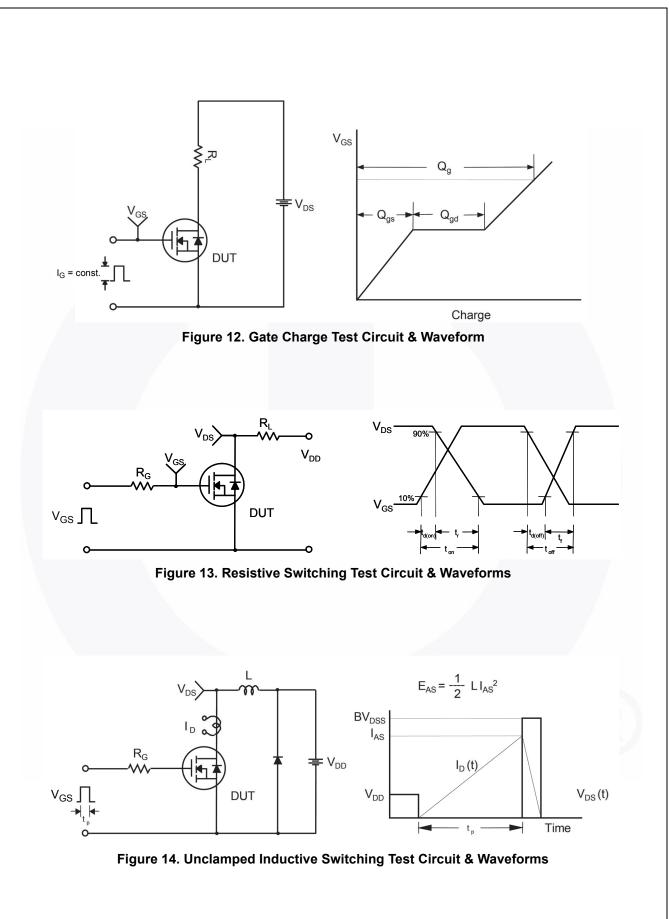
November 2013

FDP054N1 Electrical Symbol Off Characte	0 FDP054N10	i uonu	ge Packing Me	ethod	Reel Size	Тар	e Width	Qua	ntity
Symbol		TO-22			N/A	N/A		50 units	
	Characteristics $T_c$ =	25°C unless	s otherwise noted.						
Off Characte	Parameter		Test C	Condition	6	Min.	Тур.	Max.	Unit
	eristics								
BV <sub>DSS</sub>	Drain to Source Breakdown V	oltage	I <sub>D</sub> = 250 μA, V <sub>G</sub>	<sub>S</sub> = 0 V, T	<sub>C</sub> = 25°C	100	-	-	V
ABV <sub>DSS</sub>	DSS Breakdown Voltage Temperature		$I_D = 250 \ \mu$ A, Referenced to $25^{\circ}$ C			-	0.01	I	V/ºC
I <sub>DSS</sub>	Zero Gate Voltage Drain Current		$\frac{V_{DS} = 100 \text{ V}, \text{ V}_{GS} = 0 \text{ V}}{V_{DS} = 100 \text{ V}, \text{ V}_{GS} = 0 \text{ V}, \text{ T}_{C} = 150^{\circ}\text{C}}$			-		1 500	μA
I <sub>GSS</sub> (	Gate to Body Leakage Curren	ıt	V <sub>GS</sub> = ±20 V, V <sub>I</sub>		0	-	-	±100	nA
	vietiee								4
On Characte									
00()	Gate Threshold Voltage		$V_{GS} = V_{DS}, I_D =$			2.5	3.5	4.5	V
00(01)	Static Drain to Source On Res	istance	V <sub>GS</sub> = 10 V, I <sub>D</sub> =			-	4.6	5.5	mΩ
9FS I	Forward Transconductance		V <sub>GS</sub> = 10 V, I <sub>D</sub> =	= 75 A		-	192	-	S
Dynamic Ch	aracteristics								
C <sub>iss</sub> I	Input Capacitance			<u></u>		-	9985	13280	pF
	Output Capacitance		— V <sub>DS</sub> = 25 V, V <sub>G</sub> — f = 1 MHz	<sub>S</sub> = 0 V,		-	935	1245	pF
	Reverse Transfer Capacitance	•				-	390	585	pF
	Total Gate Charge at 10V		V <sub>DS</sub> = 80 V, I <sub>D</sub> =	= 75 A,		-	156	203	nC
	Gate to Source Gate Charge		$V_{GS} = 10 V$		-	53	-	nC	
Q <sub>gd</sub>	Gate to Drain "Miller" Charge				(Note 4)	-	48	-	nC
Switching C	haracteristics								
t <sub>d(on)</sub> 1	Turn-On Delay Time					-	44	98	ns
	Turn-On Rise Time		$V_{DD} = 50 V, I_D = 75 A,$ $V_{GS} = 10 V, R_G = 4.7 \Omega$		-	92	194	ns	
t <sub>d(off)</sub> 1	Turn-Off Delay Time				-	80	170	ns	
	Turn-Off Fall Time				(Note 4)	-	39	88	ns
)rain-Sourc	e Diode Characteristic	c							
	Maximum Continuous Drain to		de Forward Currer	ıt		-	-	144	A
5	Maximum Pulsed Drain to Sou					_		576	A
	Drain to Source Diode Forward		$V_{GS} = 0 V, I_{SD} = 75 A$			_	-	1.3	V
05	Reverse Recovery Time	voltage	$V_{GS} = 0 V, I_{SD} = 75 A,$			-	57	-	ns
	Reverse Recovery Charge		$d_{\rm F}/dt = 100  A/\mu s$			-	121	-	nC

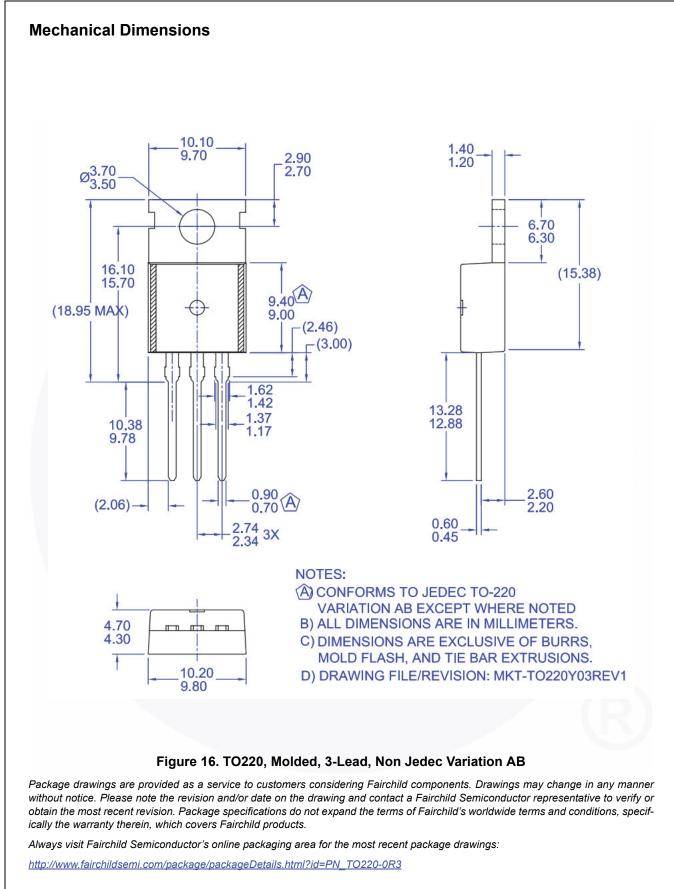


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DUT +  $V_{DS}$ a ۱<sub>sD</sub> م L Driver R<sub>G</sub>, Same Type as DUT L F ∨<sub>DD</sub>  $\prod V_{GS}$ • dv/dt controlled by  $R_{G}$ • I<sub>SD</sub> controlled by pulse period Î Gate Pulse Width V<sub>GS</sub> D = Gate Pulse Period 10V (Driver) I<sub>FM</sub>, Body Diode Forward Current I <sub>SD</sub> di/dt (DUT)  $I_{RM}$ Body Diode Reverse Current  $V_{DS}$ (DUT) Body Diode Recovery dv/dt  $V_{SD}$ V<sub>DD</sub> Body Diode Forward Voltage Drop Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms





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