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# FDP150N10 N-Channel PowerTrench<sup>®</sup> MOSFET 100 V, 57 A, 15 m $\Omega$

### Features

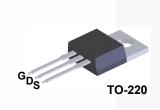
- $R_{DS(on)}$  = 12 m $\Omega$  (Typ.) @  $V_{GS}$  = 10 V,  $I_D$  = 49 A
- · Fast Switching Speed
- Low Gate Charge
- High Performance Trench Technology for Extremely Low  $R_{\text{DS}(\text{on})}$
- High Power and Current Handling Capability
- RoHS Compliant

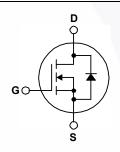
# Description

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
- Micor Solar Inverter





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

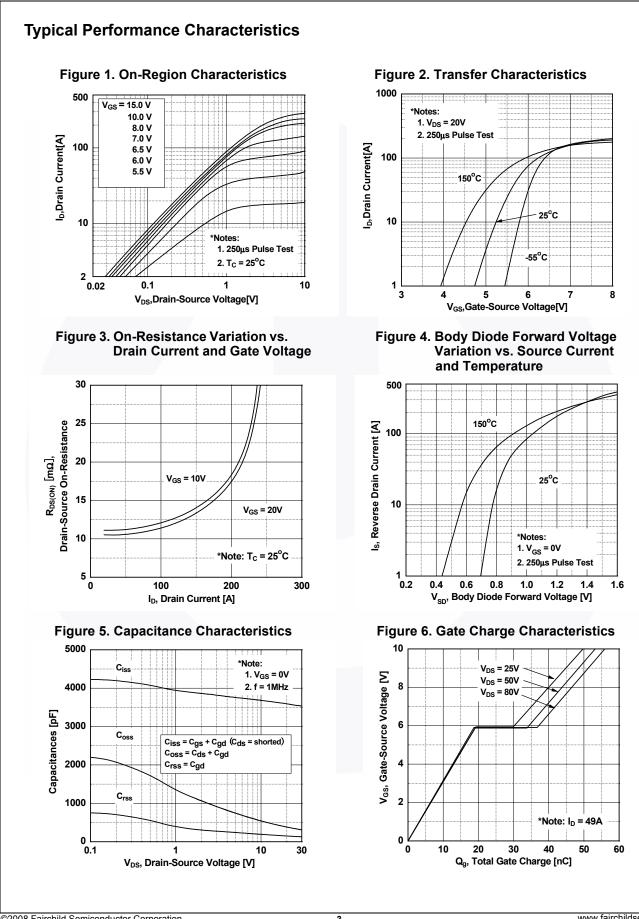
Symbol	Parameter			FDP150N10	Unit
V <sub>DSS</sub>	Drain to Source Voltage	100	V		
V <sub>GSS</sub>	Gate to Source Voltage			±20	V
I <sub>D</sub>	Drain Current	- Continuous (T <sub>C</sub> = 25 <sup>o</sup> C)		57	A
	Drain Current	- Continuous (T <sub>C</sub> = 100 <sup>o</sup> C)		40	A
I <sub>DM</sub>	Drain Current	- Pulsed (	Note 1)	228	A
E <sub>AS</sub>	Single Pulsed Avalanche Energy (Note 2)			132	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		(Note 3)	7.5	V/ns
P <sub>D</sub>	Power Dissipation	(T <sub>C</sub> = 25°C)		110	W
		- Derate Above 25°C		0.88	W/ºC
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range			-55 to +150	°C
TL	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds			300	°C

# **Thermal Characteristics**

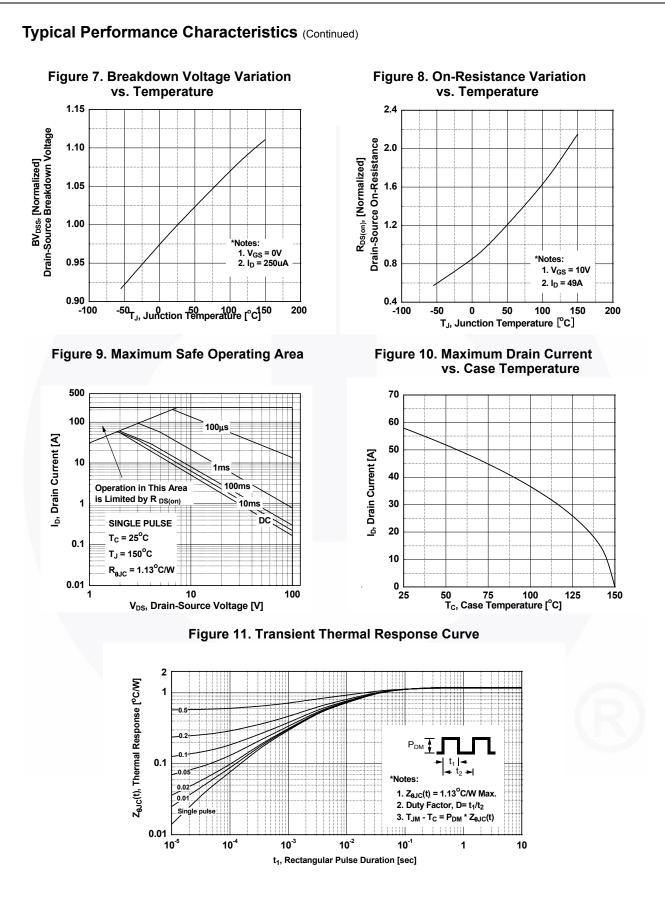
Symbol	Parameter	FDP150N10	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	1.13	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	°C/W

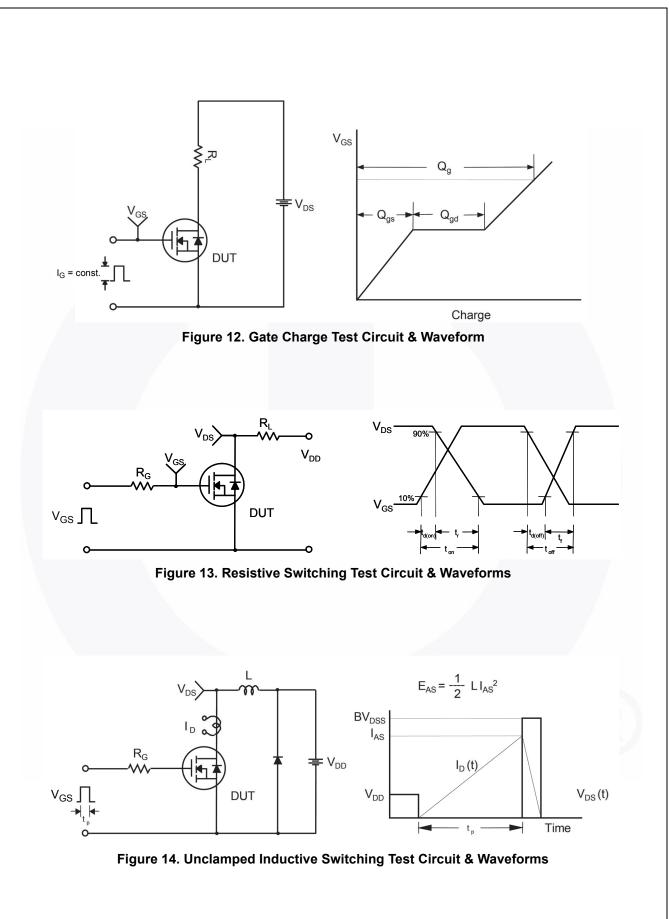
November 2013

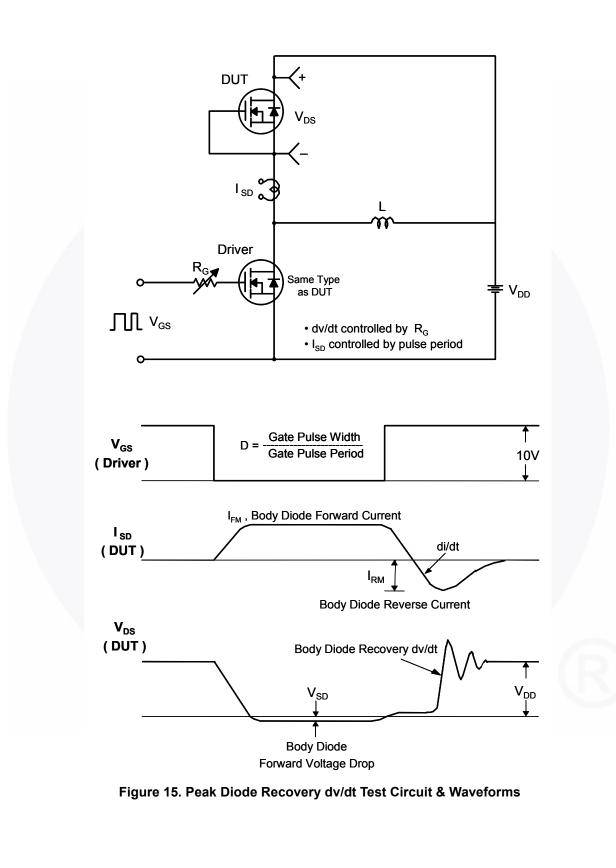
Part Number Top Mark		ckage	Packing Method	Reel Size	Тар	e Width	Qua	ntity
· · · · · · · · · · · · · · · · · · ·		0-220	Tube	N/A	N/A		50 units	
Characteristics	<b>δ</b> T <sub>C</sub> = 25°Cι	inless oth	nerwise noted.					
Param	eter		Test Conditions		Min.	Тур.	Max.	Unit
eristics								
	own Voltage	۱ <sub>ח</sub>	= 250 μA, V <sub>GS</sub> = 0 V	T <sub>C</sub> = 25 <sup>o</sup> C	100	-	-	V
Breakdown Voltage Temperature Coefficient Zero Gate Voltage Drain Current			$I_D$ = 250 µA, Referenced to 25°C $V_{DS}$ = 100 V, $V_{GS}$ = 0 V		-	0.1	-	V/ºC
					-	-	1 500	μA
Gate to Body Leakage Current					-	-	±100	nA
eristics								
1	•	V	<sub>3S</sub> = V <sub>DS</sub> , Ι <sub>D</sub> = 250 μΑ		2.5	-	4.5	V
-					-	12	15	mΩ
Forward Transconducta	ince				-	156	-	S
naracteristics								
				-	3580	4760	pF	
Output Capacitance				-	340	450	pF	
Reverse Transfer Capa	citance	T =	f = 1 MHz		-	140	210	pF
haracteristics				·				
Turn-On Delay Time				-	47	104	ns	
Turn-On Rise Time				-	164	338	ns	
Turn-Off Delay Time		V		-	86	182	ns	
Turn-Off Fall Time				(Note 4)	-	83	176	ns
Total Gate Charge at 10	V	V	s = 80 V, In = 49 A,		-	53	69	nC
Gate to Source Gate Ch	narge		$V_{GS} = 10 V$		-	19	-	nC
Gate to Drain "Miller" Cl	narge			(Note 4)	-	15	-	nC
ce Diode Characte	ristics							
Maximum Continuous D	rain to Source	Diode Fo	orward Current		7-	-	57	Α
Maximum Pulsed Drain	to Source Diod	le Forwa	orward Current		-	-	228	Α
Drain to Source Diode F	orward Voltag	e V <sub>o</sub>	<sub>3S</sub> = 0 V, I <sub>SD</sub> = 49 A		-	-	1.3	V
Reverse Recovery Time			$V_{GS} = 0 V, I_{SD} = 49 A,$		-	41	-	ns
Reverse Recovery Charge			dl <sub>F</sub> /dt = 100 A/μs		-	70	-	nC
	Characteristics Parame eristics Drain to Source Breakd Breakdown Voltage Ten Coefficient Zero Gate Voltage Drain Gate to Body Leakage G eristics Gate Threshold Voltage Static Drain to Source C Forward Transconducta haracteristics Input Capacitance Output Capacitance Reverse Transfer Capac Characteristics Turn-On Delay Time Turn-Off Delay Time Turn-Off Fall Time Total Gate Charge at 10 Gate to Source Gate CF Gate to Drain "Miller" CF ce Diode Character Maximum Continuous D Maximum Pulsed Drain Drain to Source Diode F	Characteristics $T_{C} = 25^{\circ}C u$ Parameter eristics Drain to Source Breakdown Voltage Breakdown Voltage Temperature Coefficient Zero Gate Voltage Drain Current Gate to Body Leakage Current eristics Gate Threshold Voltage Static Drain to Source On Resistance Forward Transconductance haracteristics Input Capacitance Output Capacitance Reverse Transfer Capacitance Characteristics Turn-On Delay Time Turn-On Rise Time Turn-Off Fall Time Total Gate Charge at 10V Gate to Source Gate Charge Gate to Drain "Miller" Charge Maximum Continuous Drain to Source Diode	Characteristics       T <sub>C</sub> = 25°C unless off         Parameter       In         eristics       In         Drain to Source Breakdown Voltage       In         Breakdown Voltage Temperature       In         Coefficient       Vr         Zero Gate Voltage Drain Current       Vr         Gate to Body Leakage Current       Vr         Gate Threshold Voltage       Vr         Static Drain to Source On Resistance       Vr         Forward Transconductance       Vr         Numu Capacitance       Vr         Output Capacitance       Vr         Turn-On Delay Time       Vr         Turn-On Rise Time       Vr         Turn-Off Fall Time       Vr         Total Gate Charge at 10V       Vr         Gate to Source Gate Charge       Vr         Gate to Drain "Miller" Charge       Vr         Ce Diode Characteristics       Vr         Maximum Continuous Drain to Source Diode Forward       Vr         Maximum Pulsed Drain to Source Diode Forward       Vr         Maximum Pu	CharacteristicsParameterTest ConditioneristicsDrain to Source Breakdown Voltage $I_D = 250 \ \mu$ A, $V_{GS} = 0 \ V$ Breakdown Voltage Temperature Coefficient $I_D = 250 \ \mu$ A, ReferenceZero Gate Voltage Drain Current $V_{DS} = 100 \ V, V_{GS} = 0 \ V$ Gate to Body Leakage Current $V_{GS} = \pm 20 \ V, V_{DS} = 0 \ V$ Gate to Body Leakage Current $V_{GS} = \pm 20 \ V, V_{DS} = 0 \ V$ Gate Threshold Voltage $V_{GS} = \pm 20 \ V, V_{DS} = 0 \ V$ Forward Transconductance $V_{DS} = 100 \ V, I_D = 49 \ A$ Forward Transconductance $V_{DS} = 20 \ V, I_D = 49 \ A$ NaracteristicsInput CapacitanceInput Capacitance $V_{DS} = 25 \ V, V_{GS} = 0 \ V, f = 1 \ MHz$ Turn-On Delay Time $V_{DD} = 50 \ V, I_D = 49 \ A, V_{GS} = 10 \ V, R_G = 25 \ \Omega, V_{GS} = 10 \ V, R_G = 25 \ \Omega, V_{GS} = 10 \ V, R_G = 25 \ \Omega, V_{GS} = 10 \ V, R_G = 25 \ \Omega, V_{GS} = 10 \ V, R_G = 25 \ \Omega, V_{GS} = 10 \ V, R_G = 25 \ \Omega, V_{GS} = 10 \ V, R_G = 25 \ \Omega, V_{GS} = 10 \ V, R_G = 25 \ \Omega, V_{GS} = 10 \ V, R_G = 25 \ \Omega, V_{GS} = 10 \ V, R_G = 10 \ V$ CharacteristicsIntro-Off Fall TimeTotal Gate Charge at 10V $V_{DS} = 80 \ V, I_D = 49 \ A, V_{GS} = 10 \ V$ Gate to Drain "Miller" ChargeV_{GS} = 10 \ VCe Diode CharacteristicsMaximum Continuous Drain to Source Diode Forward CurrentMaximum Pulsed Drain to Source Diode Forward CurrentV_{GS} = 0 \ V, I_S = 49 \ A	Characteristics       T <sub>c</sub> = 25°C unless otherwise noted.         Parameter       Test Conditions         eristics       In = 250 $\mu$ A, V <sub>GS</sub> = 0 V, T <sub>C</sub> = 25°C         Breakdown Voltage Temperature Coefficient       Ip = 250 $\mu$ A, Referenced to 25°C         Zero Gate Voltage Drain Current       VDS = 100 V, VGS = 0 V         Zero Gate Voltage Drain Current       VOS = 100 V, VGS = 0 V, TC = 150°C         Gate to Body Leakage Current       VGS = ±20 V, VDS = 0 V         eristics       Gate Threshold Voltage       VGS = VDS, Ip = 250 $\mu$ A         Static Drain to Source On Resistance       VGS = 10 V, Ip = 49 A         Forward Transconductance       VDS = 20 V, Ip = 49 A         naracteristics       VDS = 25 V, VGS = 0 V, f = 1 MHz         Input Capacitance       VDS = 25 V, VGS = 0 V, f = 1 MHz         Reverse Transfer Capacitance       VDS = 50 V, Ip = 49 A, VGS = 0 V, f = 1 MHz         Turn-On Delay Time       VDS = 50 V, Ip = 49 A, VGS = 10 V, RG = 25 \Omega         Turn-Off Fall Time       VDS = 80 V, Ip = 49 A, VGS = 10 V, RG = 25 \Omega         Turn-Off Fall Time       (Note 4)         Total Gate Charge at 10V       VDS = 80 V, Ip = 49 A, VGS = 10 V         Gate to Drain "Miller" Charge       VOS = 10 V       (Note 4)         Gate to Drain Time       (Note 4)       VGS = 10 V       (Note 4) <t< td=""><td>Characteristics       <math>T_C = 25^{\circ}C</math> unless otherwise noted.         Parameter       Test Conditions       Min.         eristics       ID       Parameter       Test Conditions       Min.         Breakdown Voltage Temperature Coefficient       ID       <math>250 \mu</math>A, <math>V_{GS} = 0 V</math>, <math>T_C = 25^{\circ}C</math>       100         Zero Gate Voltage Drain Current       <math>V_{DS} = 100 V</math>, <math>V_{GS} = 0 V</math>       -         Gate to Body Leakage Current       <math>V_{GS} = 100 V</math>, <math>V_{GS} = 0 V</math>, <math>T_C = 150^{\circ}C</math>       -         Gate to Body Leakage Current       <math>V_{GS} = 100 V</math>, <math>V_{GS} = 0 V</math>, <math>T_C = 150^{\circ}C</math>       -         Gate Threshold Voltage       <math>V_{GS} = 100 V</math>, <math>V_{DS} = 0 V</math>       -         Gate Threshold Voltage       <math>V_{GS} = 10 V</math>, <math>I_D = 49 A</math>       -         Forward Transconductance       <math>V_{DS} = 20 V</math>, <math>I_D = 49 A</math>       -         Paracteristics       Input Capacitance       <math>V_{DS} = 25 V</math>, <math>V_{GS} = 0 V</math>, <math>\frac{1}{6} = 1 MHz</math>       -         Characteristics       Input Capacitance       <math>V_{DS} = 50 V</math>, <math>I_D = 49 A</math>, <math>\frac{1}{2} = 25 \Omega</math>       -         Turn-On Delay Time       <math>V_{DS} = 10 V</math>, <math>R_G = 25 \Omega</math>       -       -         Turn-Off Fall Time       <math>V_{OS} = 10 V</math>, <math>R_G = 25 \Omega</math>       -       -         Gate to Darain "Miller" Charge       <math>V_{OS} = 10 V</math>       = 49 A, <math>V_{CS} = 10 V</math>       -     </td></t<> <td><math display="block">\begin{tabular}{ c c c c } \hline Characteristics &amp; T_C = 25^\circ C unless otherwise noted. \\ \hline Parameter &amp; Test Conditions &amp; Min. Typ. \\ \hline Prain to Source Breakdown Voltage &amp; I_D = 250 \ \mu A, \ V_{GS} = 0 \ V, \ T_C = 25^\circ C &amp; 100 &amp; - \\ \hline Breakdown Voltage Temperature &amp; I_D = 250 \ \mu A, \ Referenced to 25^\circ C &amp; - &amp; 0.1 \\ \hline Coefficient &amp; V_{DS} = 100 \ V, \ V_{GS} = 0 \ V, \ T_C = 150^\circ C &amp; - &amp; - \\ \hline V_{DS} = 100 \ V, \ V_{GS} = 0 \ V, \ T_C = 150^\circ C &amp; - &amp; - \\ \hline Cate to Body Leakage Current &amp; V_{GS} = \pm 20 \ V, \ V_{DS} = 0 \ V &amp; - &amp; - &amp; - \\ \hline eristics &amp; &amp; &amp; &amp; &amp; &amp; &amp; \\ \hline Cate Threshold Voltage &amp; V_{GS} = V_{DS}, \ I_D = 250 \ \mu A &amp; 2.5 &amp; - \\ \hline Static Drain to Source On Resistance &amp; V_{GS} = 10 \ V, \ I_D = 49 \ A &amp; - &amp; 112 \\ \hline Forward Transconductance &amp; V_{DS} = 25 \ V, \ V_{GS} = 0 \ V, \ f = 1 \ MHz &amp; - &amp; 140 \\ \hline Daracteristics &amp; &amp; &amp; &amp; \\ \hline Input Capacitance &amp; V_{DS} = 25 \ V, \ V_{GS} = 0 \ V, \ f = 1 \ MHz &amp; - &amp; 140 \\ \hline Characteristics &amp; &amp; &amp; &amp; \\ \hline Turn-On Delay Time &amp; V_{DS} = 50 \ V, \ I_D = 49 \ A, \ Cost = 164 \ Turn-Off Fall Time &amp; V_{OS} = 10 \ V, \ V_{CS} = 10 \ V, \ V_{CS} = 25 \ \Omega, \ V_{CS} = 10 \ V, \ V_{CS} = 30 \ V, \ I_{C} = 330 \ Dotto = 0 \ (Note 4) \ - &amp; 164 \ - &amp; 333 \ Dotal Gate to Drain Time \ V_{OS} = 10 \ V, \ V_{CS} = 10 \ V, \ I_{C} = 49 \ A, \ - &amp; 164 \ - &amp; 333 \ Dotal Gate Charge at 10V \ V_{OS} = 80 \ V, \ I_{D} = 49 \ A, \ - &amp; 139 \ Cost = 0 \ V, \ OR \ B = 10 \ V, \ OR \ B</math></td> <td><math display="block">\begin{tabular}{ c c c c } \hline Characteristics \$\$T_C = 25^\circ C\$ unless otherwise noted.\$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ </math></td>	Characteristics $T_C = 25^{\circ}C$ unless otherwise noted.         Parameter       Test Conditions       Min.         eristics       ID       Parameter       Test Conditions       Min.         Breakdown Voltage Temperature Coefficient       ID $250 \mu$ A, $V_{GS} = 0 V$ , $T_C = 25^{\circ}C$ 100         Zero Gate Voltage Drain Current $V_{DS} = 100 V$ , $V_{GS} = 0 V$ -         Gate to Body Leakage Current $V_{GS} = 100 V$ , $V_{GS} = 0 V$ , $T_C = 150^{\circ}C$ -         Gate to Body Leakage Current $V_{GS} = 100 V$ , $V_{GS} = 0 V$ , $T_C = 150^{\circ}C$ -         Gate Threshold Voltage $V_{GS} = 100 V$ , $V_{DS} = 0 V$ -         Gate Threshold Voltage $V_{GS} = 10 V$ , $I_D = 49 A$ -         Forward Transconductance $V_{DS} = 20 V$ , $I_D = 49 A$ -         Paracteristics       Input Capacitance $V_{DS} = 25 V$ , $V_{GS} = 0 V$ , $\frac{1}{6} = 1 MHz$ -         Characteristics       Input Capacitance $V_{DS} = 50 V$ , $I_D = 49 A$ , $\frac{1}{2} = 25 \Omega$ -         Turn-On Delay Time $V_{DS} = 10 V$ , $R_G = 25 \Omega$ -       -         Turn-Off Fall Time $V_{OS} = 10 V$ , $R_G = 25 \Omega$ -       -         Gate to Darain "Miller" Charge $V_{OS} = 10 V$ = 49 A, $V_{CS} = 10 V$ -	$\begin{tabular}{ c c c c } \hline Characteristics & T_C = 25^\circ C unless otherwise noted. \\ \hline Parameter & Test Conditions & Min. Typ. \\ \hline Prain to Source Breakdown Voltage & I_D = 250 \ \mu A, \ V_{GS} = 0 \ V, \ T_C = 25^\circ C & 100 & - \\ \hline Breakdown Voltage Temperature & I_D = 250 \ \mu A, \ Referenced to 25^\circ C & - & 0.1 \\ \hline Coefficient & V_{DS} = 100 \ V, \ V_{GS} = 0 \ V, \ T_C = 150^\circ C & - & - \\ \hline V_{DS} = 100 \ V, \ V_{GS} = 0 \ V, \ T_C = 150^\circ C & - & - \\ \hline Cate to Body Leakage Current & V_{GS} = \pm 20 \ V, \ V_{DS} = 0 \ V & - & - & - \\ \hline eristics & & & & & & & \\ \hline Cate Threshold Voltage & V_{GS} = V_{DS}, \ I_D = 250 \ \mu A & 2.5 & - \\ \hline Static Drain to Source On Resistance & V_{GS} = 10 \ V, \ I_D = 49 \ A & - & 112 \\ \hline Forward Transconductance & V_{DS} = 25 \ V, \ V_{GS} = 0 \ V, \ f = 1 \ MHz & - & 140 \\ \hline Daracteristics & & & & \\ \hline Input Capacitance & V_{DS} = 25 \ V, \ V_{GS} = 0 \ V, \ f = 1 \ MHz & - & 140 \\ \hline Characteristics & & & & \\ \hline Turn-On Delay Time & V_{DS} = 50 \ V, \ I_D = 49 \ A, \ Cost = 164 \ Turn-Off Fall Time & V_{OS} = 10 \ V, \ V_{CS} = 10 \ V, \ V_{CS} = 25 \ \Omega, \ V_{CS} = 10 \ V, \ V_{CS} = 30 \ V, \ I_{C} = 330 \ Dotto = 0 \ (Note 4) \ - & 164 \ - & 333 \ Dotal Gate to Drain Time \ V_{OS} = 10 \ V, \ V_{CS} = 10 \ V, \ I_{C} = 49 \ A, \ - & 164 \ - & 333 \ Dotal Gate Charge at 10V \ V_{OS} = 80 \ V, \ I_{D} = 49 \ A, \ - & 139 \ Cost = 0 \ V, \ OR \ B = 10 \ V, \ OR \ B$	$\begin{tabular}{ c c c c } \hline Characteristics $$T_C = 25^\circ C$ unless otherwise noted.$$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $

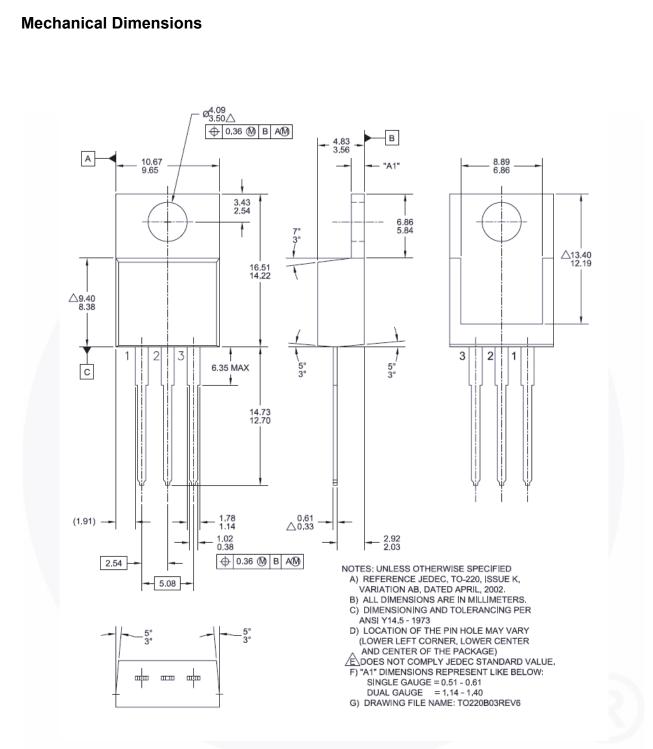


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#### Figure 16. TO-220, Molded, 3-Lead, Jedec Variation AB

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BitSiC™	Global Power Resource <sup>SM</sup>	PowerTrench <sup>®</sup>	GENERAL
Build it Now™	GreenBridge™	PowerXS™	
CorePLUS™	Green FPS™	Programmable Active Droop™	TinyBoost <sup>®</sup>
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Dual Cool™	Marking Small Speakers Sound Loude	r 🔿	TinyPWM™
EcoSPARK <sup>®</sup>	and Better™	Saving our world, 1mW/W/kW at a time™	TinyWire™
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2000	MicroFET <sup>M</sup>	SMART START™	TRUECURRENT <sup>®</sup> *
<b>E</b> <sup>B</sup>	MicroPak™	Solutions for Your Success™	µSerDes™
	MicroPak2™	SPM <sup>®</sup>	
Fairchild <sup>®</sup>	MillerDrive™		Ser Des"
Fairchild Semiconductor <sup>®</sup>		STEALTH™ SummerEFT®	UHC®
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FAST <sup>®</sup>	OptoHiT™	SuperSOT™-6	VCX™
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Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.