FAIRCHILD SEMICONDUCTOR®

November 2007

FDP2614
200V N-Channel PowerTrench MOSFET

General Description

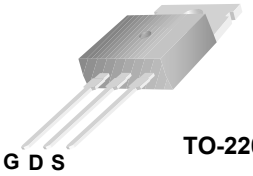
This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Application

- PDP application

Description

- 62A, 200V, $R_{DS(on)}$ = 22.9mΩ @V_{GS} = 10 V
- Fast switching speed
- Low gate charge
- High performance trench technology for extremely low $R_{DS(on)}$
- High power and current handling capability
- RoHS compliant



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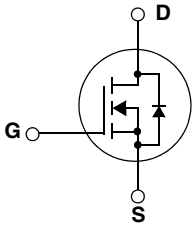


Absolute Maximum Ratings

Symbol	Parameter		Ratings	Unit
V_{DS}	Drain-Source Voltage		200	V
V_{GS}	Gate-Source Voltage		± 30	V
I_D	Drain Current	- Continuous (T_C = 25°C) - Continuous (T_C = 100°C)	62 39.3	A A
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°C) - Derate above 25°C	260 2.1	W W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	°C
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds		300	°C

Thermal Characteristics

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

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP2614	FDP2614	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	200	--	--	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25°C	--	0.2	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 200V, V_{GS} = 0V V_{DS} = 200V, V_{GS} = 0V, T_J = 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 = 31A	--	22.9	27	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 10V, I_D = 31A (Note 4)	--	72	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V f = 1.0MHz	--	5435	7230	pF
C_{oss}	Output Capacitance		--	505	675	pF
C_{rss}	Reverse Transfer Capacitance		--	110	165	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 100V, I_D = 62A V_{GS} = 10V, R_{GEN} = 25Ω (Note 4, 5)	--	77	165	ns
t_r	Turn-On Rise Time		--	284	560	ns
$t_{d(off)}$	Turn-Off Delay Time		--	103	220	ns
t_f	Turn-Off Fall Time		--	162	335	ns
Q_g	Total Gate Charge	V_{DS} = 100V, I_D = 62A V_{GS} = 10V (Note 4, 5)	--	76	99	nC
Q_{gs}	Gate-Source Charge		--	35	--	nC
Q_{gd}	Gate-Drain Charge		--	18	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	62	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	186	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0V, I_S = 62A	--	--	1.2	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_S = 62A dI_F/dt =100A/μs (Note 4)	--	145	--	ns
Q_{rr}	Reverse Recovery Charge		--	0.81	--	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} ≤ 62A, 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

Figure 1. On-Region Characteristics

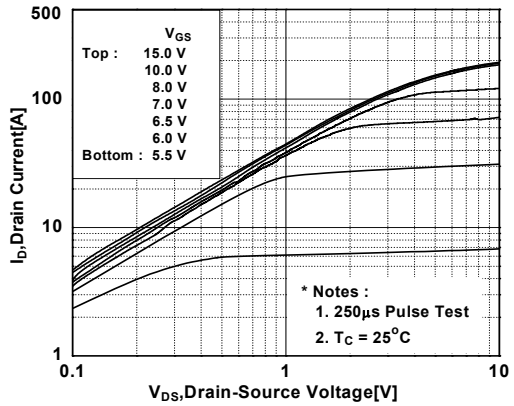


Figure 2. Transfer Characteristics

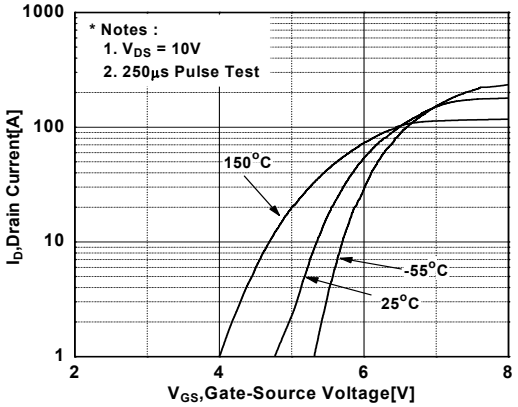


Figure3. On-Resistance Variation vs. Drain Current and Gate Voltage

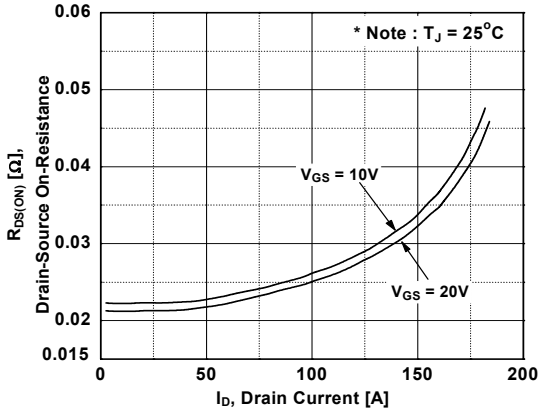


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

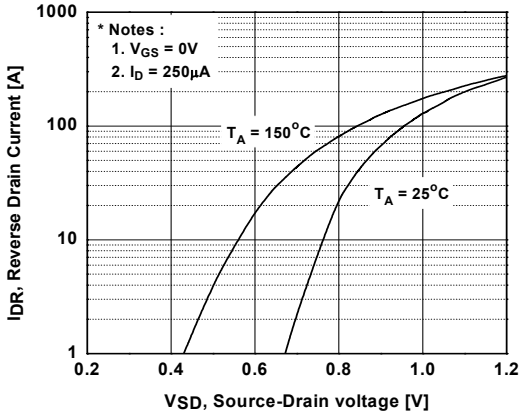


Figure 5. Capacitance Characteristics

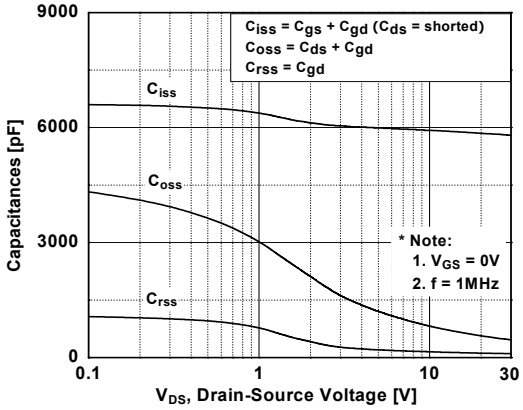


Figure 6. Gate Charge Characteristics

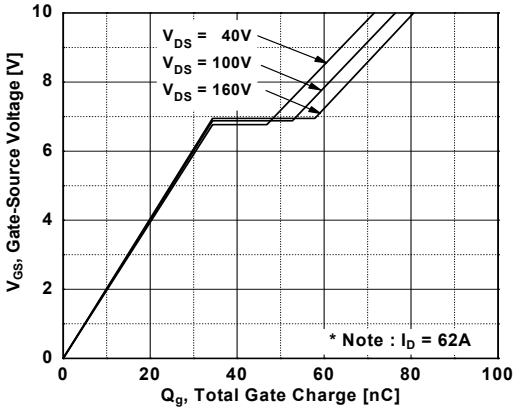


Figure 7. Breakdown Voltage Variation vs. Temperature

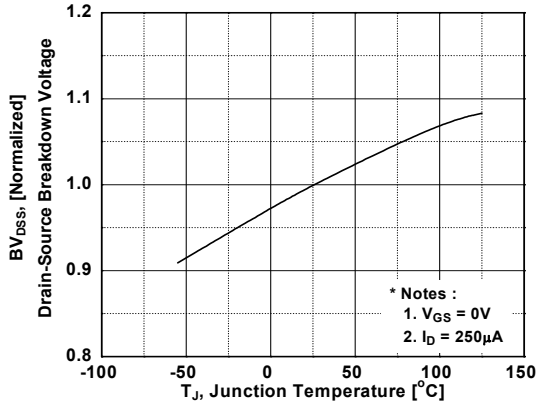


Figure 8. On-Resistance Variation vs. Temperature

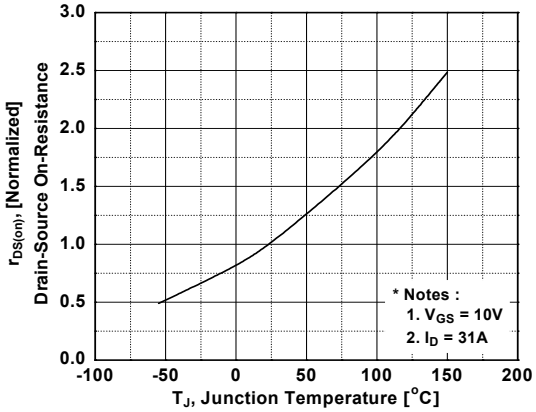


Figure 9. Maximum Safe Operating Area

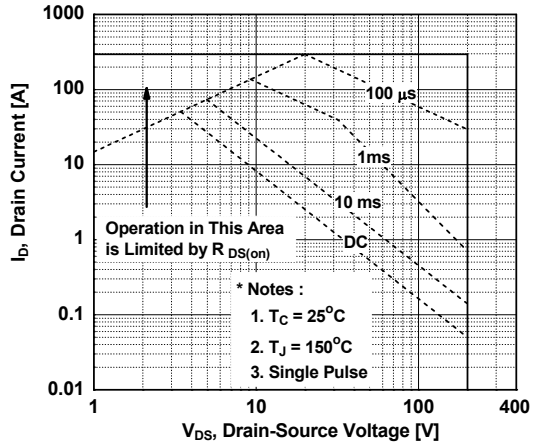


Figure 10. Maximum Drain Current vs. Case-Temperature

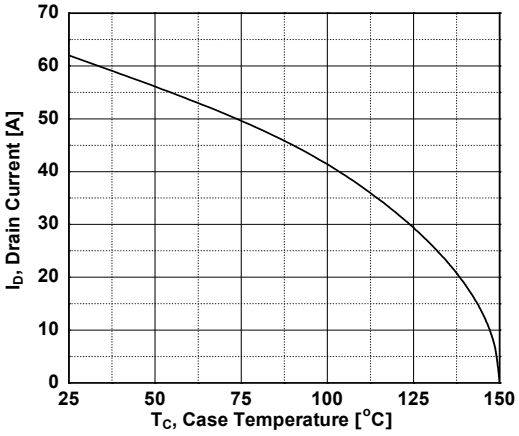
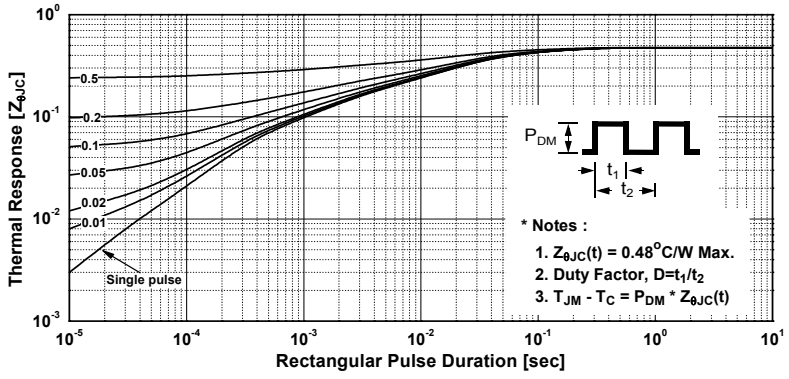
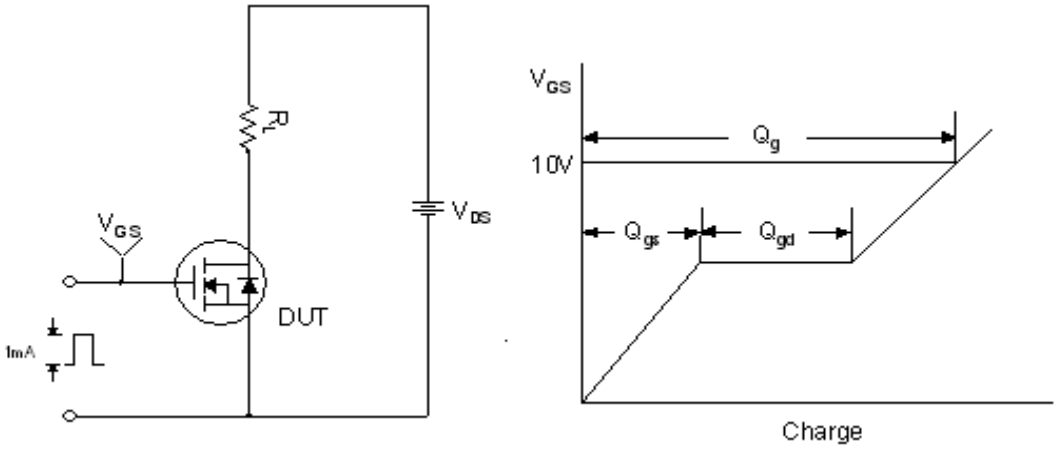


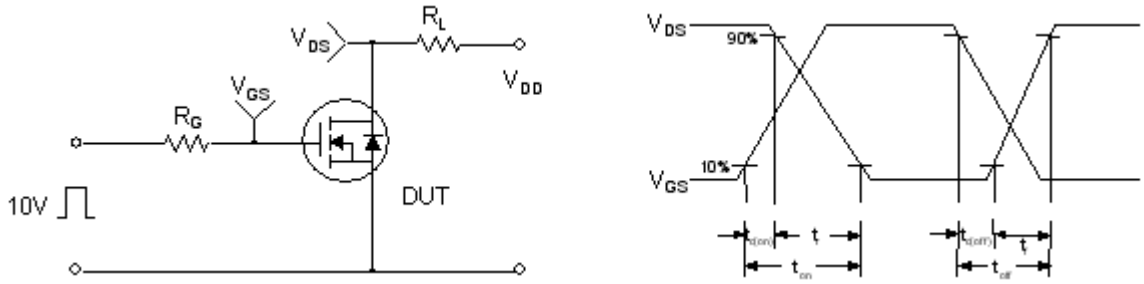
Figure 11. Transient Thermal Response Curve



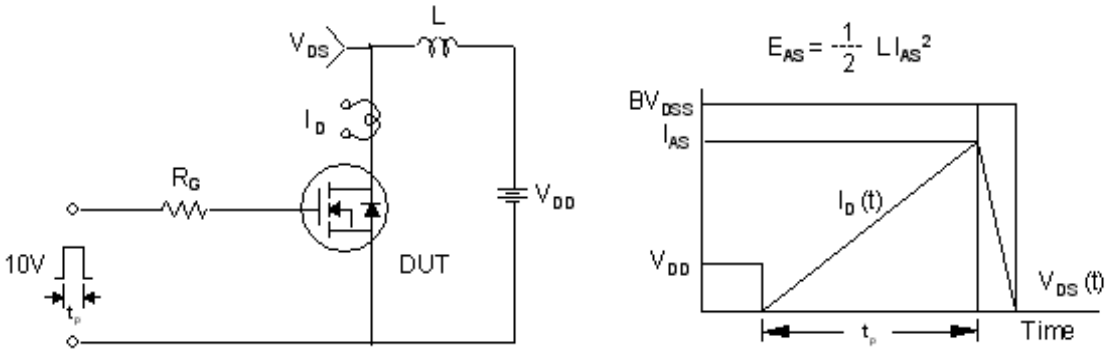
Gate Charge Test Circuit & Waveform



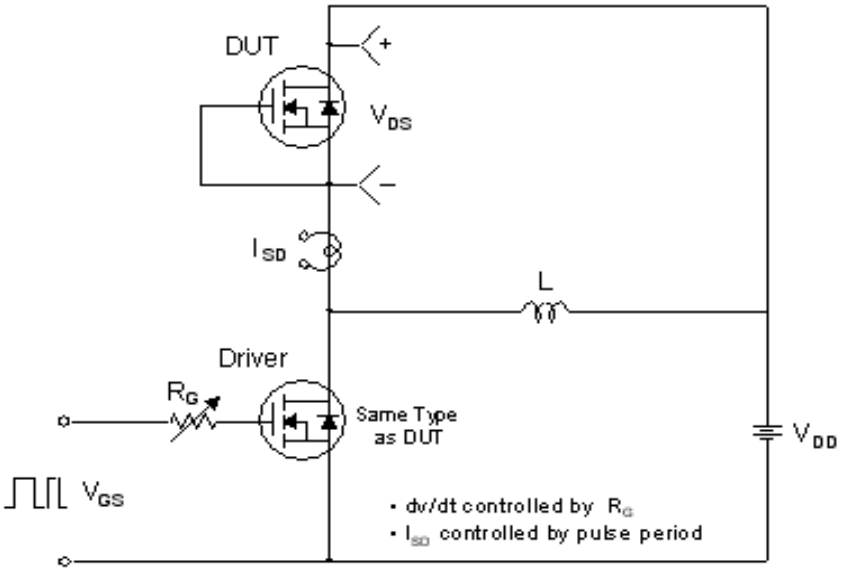
Resistive Switching Test Circuit & Waveforms

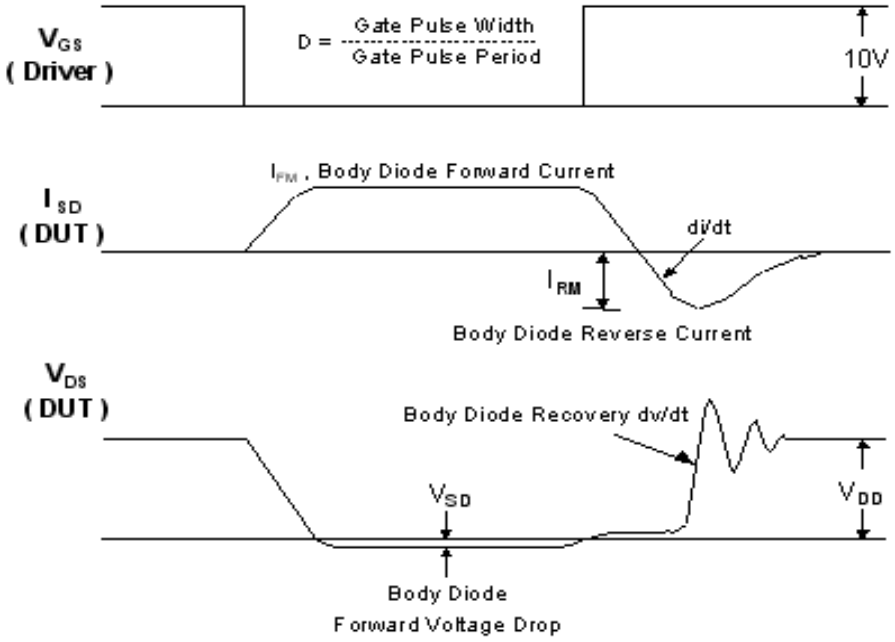


Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms





Mechanical Dimensions

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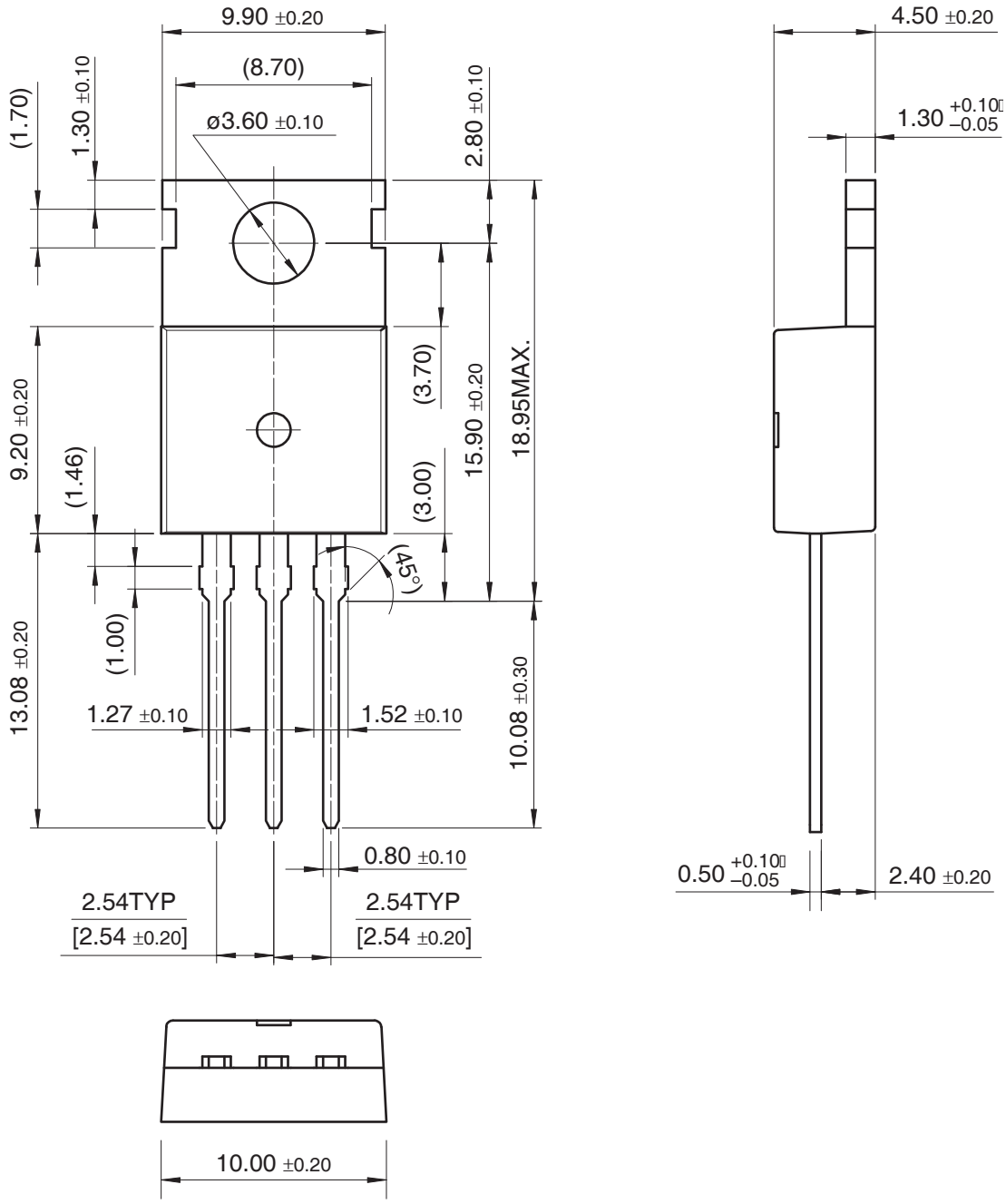

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