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FDB2614

N-Channel PowerTrench® MOSFET 200 V, 62 A, 27 mΩ

Features

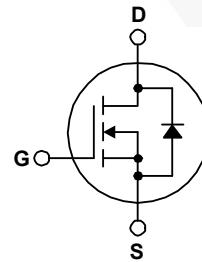
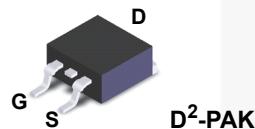
- $R_{DS(on)} = 22.9 \text{ mΩ}$ (Typ.) @ $V_{GS} = 10 \text{ V}$, $I_D = 31 \text{ A}$
- High Performance Trench technology for Extremely Low $R_{DS(on)}$
- Low Gate Charge
- High Power and Current Handling Capability

General Description

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

Applications

- Synchronous Rectification
- Battery Protection Circuit
- Motor Drives and Uninterruptible Power Supplies



Absolute Maximum Ratings

$T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	FDB2614	Unit
V_{DS}	Drain-Source Voltage	200	V
V_{GS}	Gate-Source Voltage	± 30	V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$) - Continuous ($T_C = 100^\circ\text{C}$)	62 39.3	A A
I_{DM}	Drain Current - Pulsed	(Note 1)	see Figure 9
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	V/ns
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$) - Derate above 25°C	260 2.1	W W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds	300	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	FDB2614	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	0.48	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (minimum pad of 2 oz copper), Max.	62.5	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (1 in ² pad of 2 oz copper), Max.	40	$^\circ\text{C/W}$

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDB2614	FDB2614	D ² -PAK	330 mm	24 mm	800 units

Electrical Characteristics

$T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{\text{GS}} = 0\text{V}$, $I_D = 250\mu\text{A}$, $T_J = 25^\circ\text{C}$	200	--	--	V
$\Delta\text{BV}_{\text{DSS}} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$, Referenced to 25°C	--	0.2	--	$^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{\text{DS}} = 200\text{V}$, $V_{\text{GS}} = 0\text{V}$ $V_{\text{DS}} = 200\text{V}$, $V_{\text{GS}} = 0\text{V}$, $T_J = 125^\circ\text{C}$	--	--	1 500	μA μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{\text{GS}} = 30\text{V}$, $V_{\text{DS}} = 0\text{V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{\text{GS}} = -30\text{V}$, $V_{\text{DS}} = 0\text{V}$	--	--	-100	nA
On Characteristics						
$V_{\text{GS(th)}}$	Gate Threshold Voltage	$V_{\text{DS}} = V_{\text{GS}}$, $I_D = 250\mu\text{A}$	3.0	4.0	5.0	V
$R_{\text{DS(on)}}$	Static Drain-Source On-Resistance	$V_{\text{GS}} = 10\text{V}$, $I_D = 31\text{A}$	--	22.9	27	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{\text{DS}} = 10\text{V}$, $I_D = 31\text{A}$	--	72	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{\text{DS}} = 25\text{V}$, $V_{\text{GS}} = 0\text{V}$ $f = 1.0\text{MHz}$	--	5435	7230	pF
C_{oss}	Output Capacitance		--	505	675	pF
C_{rss}	Reverse Transfer Capacitance		--	110	165	pF
Switching Characteristics						
$t_{\text{d(on)}}$	Turn-On Delay Time	$V_{\text{DD}} = 100\text{V}$, $I_D = 62\text{A}$ $V_{\text{GS}} = 10\text{V}$, $R_{\text{GEN}} = 25\Omega$	--	77	165	ns
t_r	Turn-On Rise Time		--	284	560	ns
$t_{\text{d(off)}}$	Turn-Off Delay Time		--	103	220	ns
t_f	Turn-Off Fall Time		--	162	335	ns
Q_g	Total Gate Charge	$V_{\text{DS}} = 100\text{V}$, $I_D = 62\text{A}$ $V_{\text{GS}} = 10\text{V}$	--	76	99	nC
Q_{gs}	Gate-Source Charge		--	35	--	nC
Q_{gd}	Gate-Drain Charge		--	18	--	μC
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	$V_{\text{GS}} = 0\text{V}$, $I_S = 62\text{A}$	--	--	1.2	V
t_{rr}	Reverse Recovery Time	$V_{\text{GS}} = 0\text{V}$, $I_S = 62\text{A}$ $dI/dt = 100\text{A}/\mu\text{s}$	--	145	--	ns
Q_{rr}	Reverse Recovery Charge		--	0.81	--	μC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L = 1\text{mH}$, $I_{\text{AS}} = 17\text{A}$, $V_{\text{DD}} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{\text{SD}} \leq 62\text{A}$, $dI/dt \leq 100\text{A}/\mu\text{s}$, $V_{\text{DD}} \leq \text{BV}_{\text{DSS}}$, Starting $T_J = 25^\circ\text{C}$
4. Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

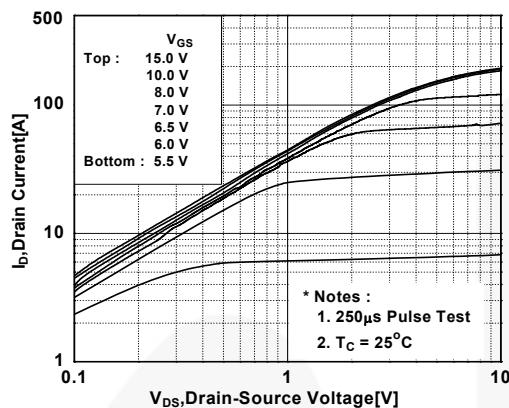


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

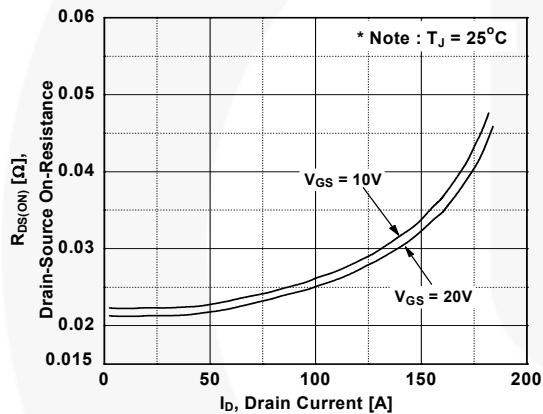


Figure 5. Capacitance Characteristics

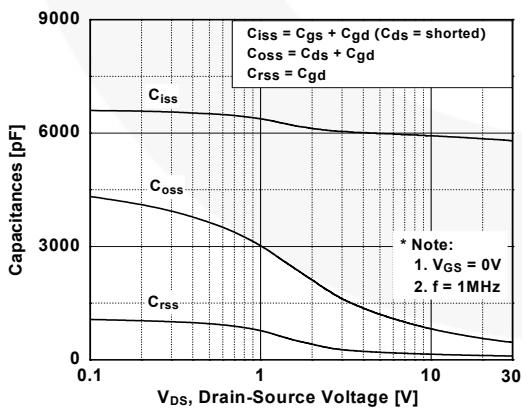


Figure 2. Transfer Characteristics

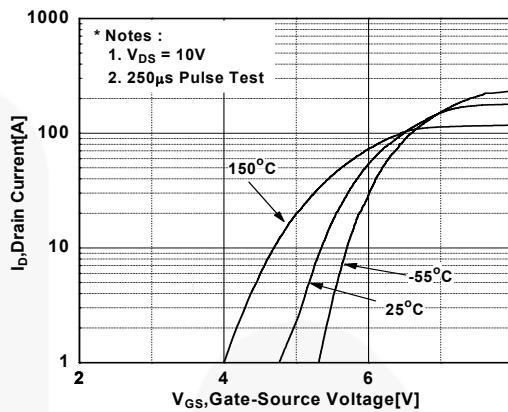


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

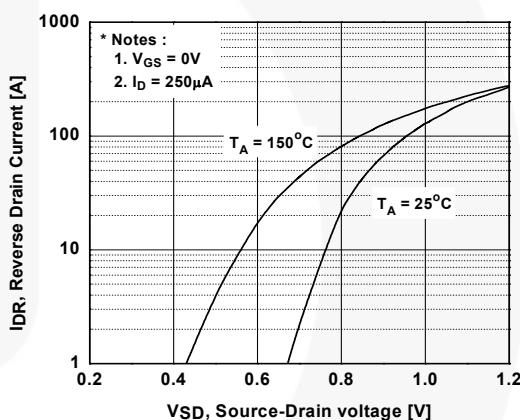
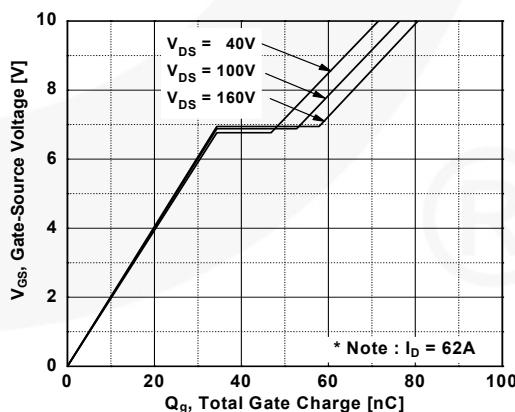


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

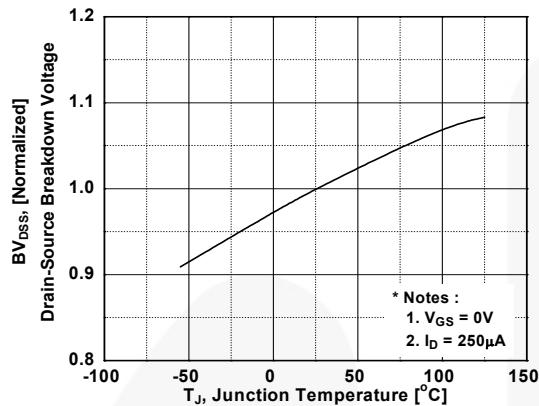


Figure 9. Maximum Safe Operating Area

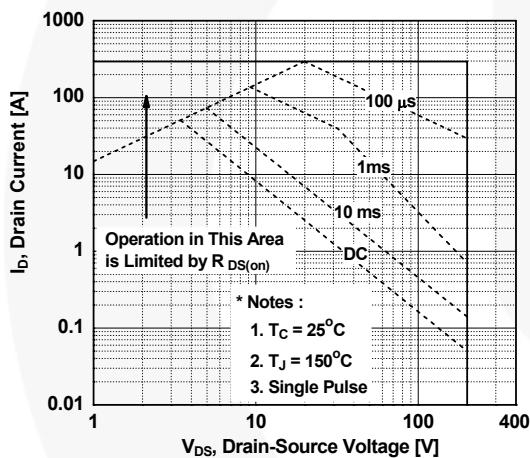


Figure 8. On-Resistance Variation vs. Temperature

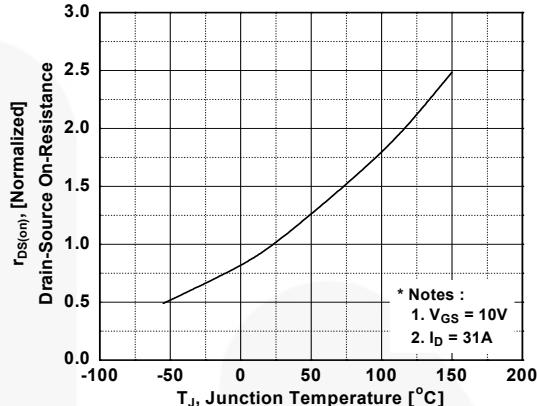


Figure 10. Maximum Drain Current vs. Case Temperature

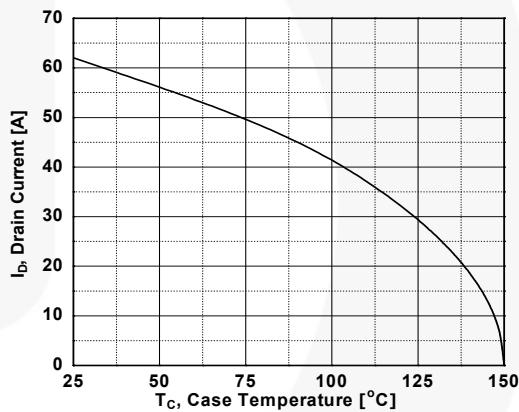


Figure 11. Transient Thermal Response Curve

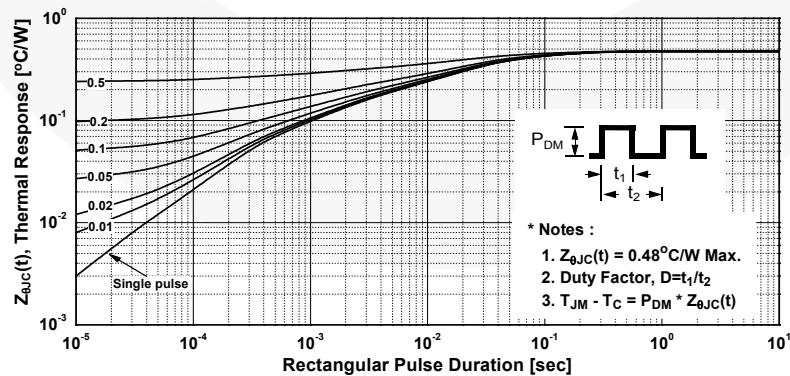


Figure 12. Gate Charge Test Circuit & Waveform

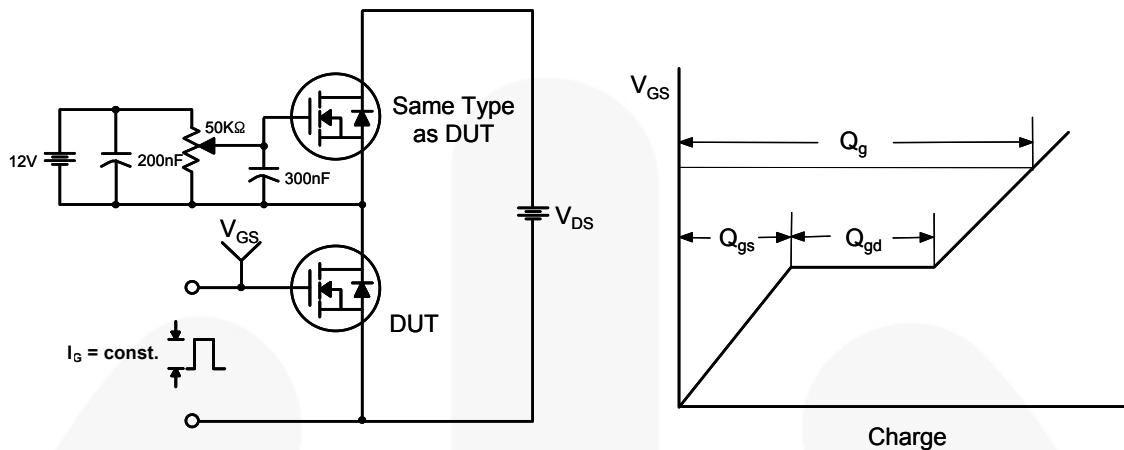


Figure 13. Resistive Switching Test Circuit & Waveforms

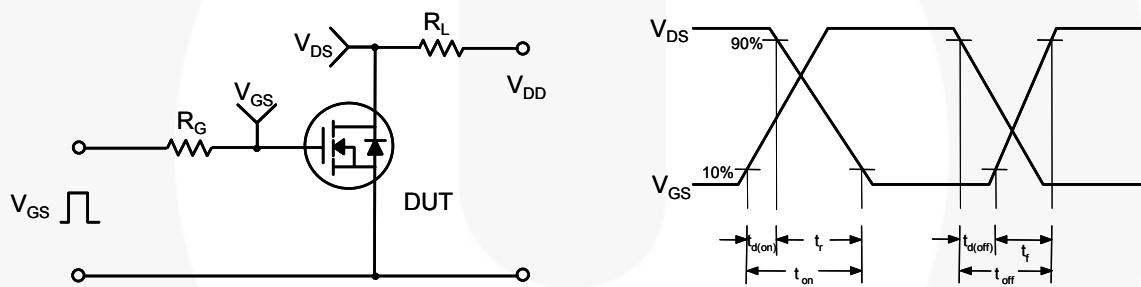


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

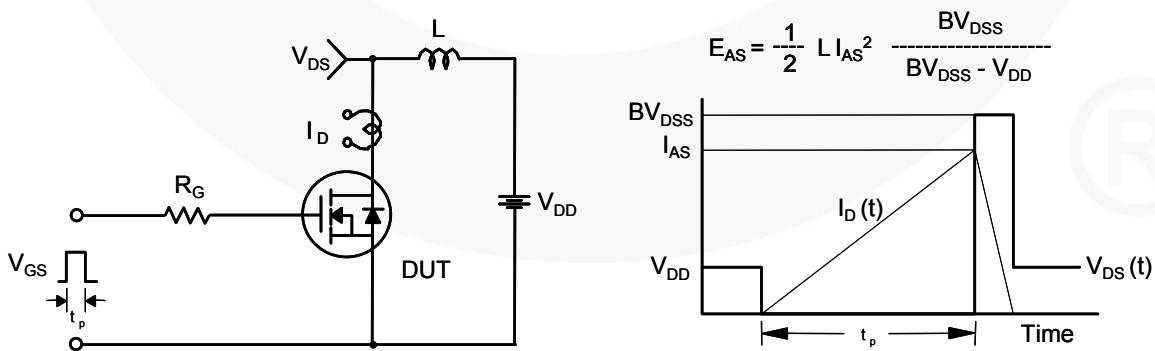
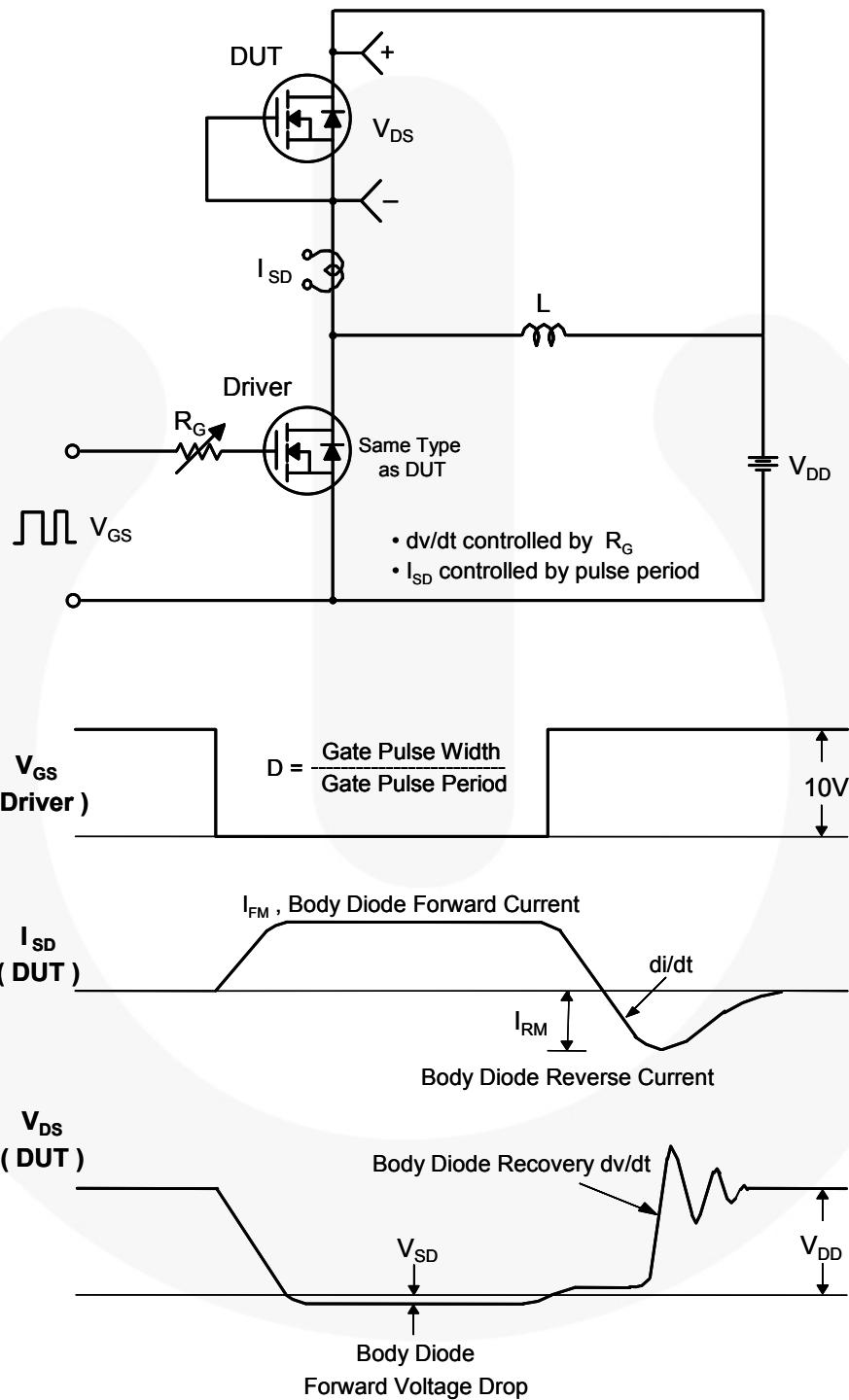


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



Mechanical Dimensions

TO-263 2L (D²PAK)

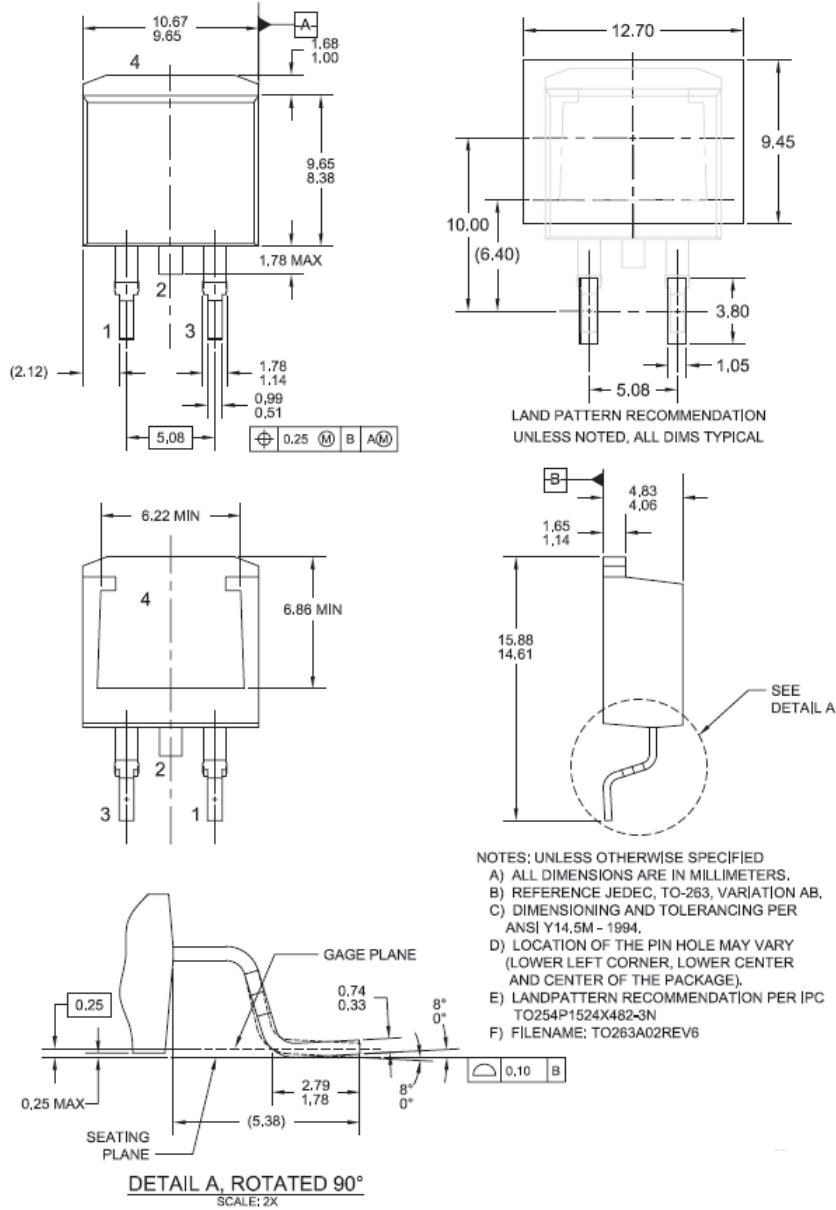


Figure 16. 2LD, TO263, Surface Mount

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Dimension in Millimeters

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Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: ocean@oceanchips.ru

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А