



SSP2N60B/SSS2N60B

600V N-Channel MOSFET

General Description

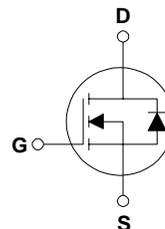
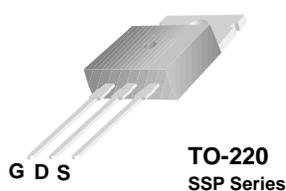
These N-Channel enhancement mode power field effect transistors are produced using Fairchild's proprietary, planar, DMOS technology.

This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switch mode power supplies.

Features

- 2.0A, 600V, $R_{DS(on)} = 5.0\Omega$ @ $V_{GS} = 10V$
- Low gate charge (typical 12.5 nC)
- Low C_{rss} (typical 7.6 pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

Typical Characteristics



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

Symbol	Parameter	SSP2N60B	SSS2N60B	Units
V_{DSS}	Drain-Source Voltage	600		V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$) - Continuous ($T_C = 100^\circ\text{C}$)	2.0	2.0 *	A
		1.3	1.3 *	A
I_{DM}	Drain Current - Pulsed (Note 1)	6.0	6.0 *	A
V_{GSS}	Gate-Source Voltage	± 30		V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	120		mJ
I_{AR}	Avalanche Current (Note 1)	2.0		A
E_{AR}	Repetitive Avalanche Energy (Note 1)	5.4		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5.5		V/ns
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$) - Derate above 25°C	54	23	W
		0.43	0.18	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 purposes, 1/8" from case for 5 seconds	300		$^\circ\text{C}$

* Drain current limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	SSP2N60B	SSS2N60B	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case Max.	2.32	5.5	$^\circ\text{C}/\text{W}$
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink Typ.	0.5	--	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient Max.	62.5	62.5	$^\circ\text{C}/\text{W}$

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	600	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C	--	0.65	--	$\text{V}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$	--	--	10	μA
		$V_{DS} = 480\text{ V}, T_C = 125^\circ\text{C}$	--	--	100	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 1.0\text{ A}$	--	3.8	5.0	Ω
g_{FS}	Forward Transconductance	$V_{DS} = 40\text{ V}, I_D = 1.0\text{ A}$ (Note 4)	--	2.05	--	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	380	490	pF
C_{oss}	Output Capacitance		--	35	46	pF
C_{riss}	Reverse Transfer Capacitance		--	7.6	9.9	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 300\text{ V}, I_D = 2.0\text{ A},$ $R_G = 25\ \Omega$	--	16	40	ns	
t_r	Turn-On Rise Time		--	50	110	ns	
$t_{d(off)}$	Turn-Off Delay Time		(Note 4, 5)	--	40	90	ns
t_f	Turn-Off Fall Time		(Note 4, 5)	--	40	90	ns
Q_g	Total Gate Charge		$V_{DS} = 480\text{ V}, I_D = 2.0\text{ A},$ $V_{GS} = 10\text{ V}$	--	12.5	17	nC
Q_{gs}	Gate-Source Charge	(Note 4, 5)	--	2.2	--	nC	
Q_{gd}	Gate-Drain Charge	(Note 4, 5)	--	5.4	--	nC	

Drain-Source Diode Characteristics and Maximum Ratings

I_S	Maximum Continuous Drain-Source Diode Forward Current	--	--	2.0	A	
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current	--	--	6.0	A	
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 2.0\text{ A}$	--	--	1.4	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 2.0\text{ A},$ $di_F / dt = 100\text{ A}/\mu\text{s}$	--	250	--	ns
Q_{rr}	Reverse Recovery Charge	(Note 4)	--	1.31	--	μC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $L = 55\text{ mH}, I_{AS} = 2.0\text{ A}, V_{DD} = 50\text{ V}, R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 2.0\text{ A}, di/dt \leq 300\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse width $\leq 300\ \mu\text{s}$, Duty cycle $\leq 2\%$
5. Essentially independent of operating temperature

Typical Characteristics

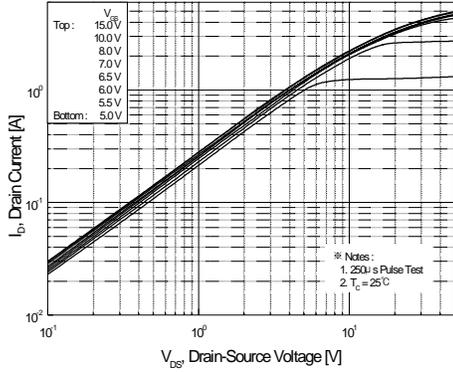


Figure 1. On-Region Characteristics

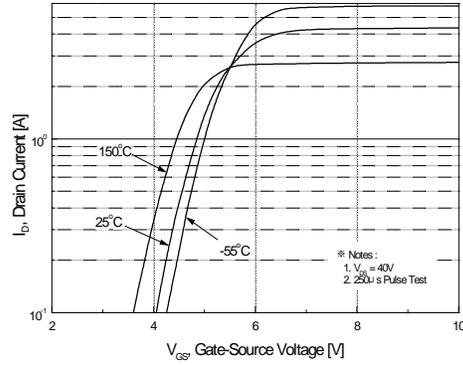


Figure 2. Transfer Characteristics

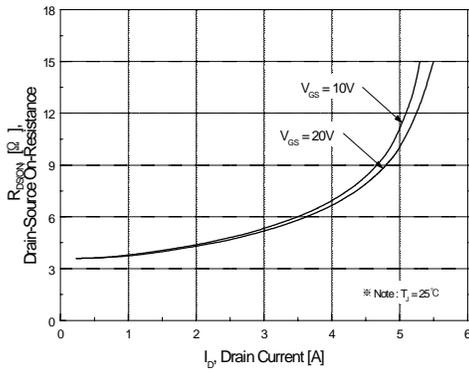


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

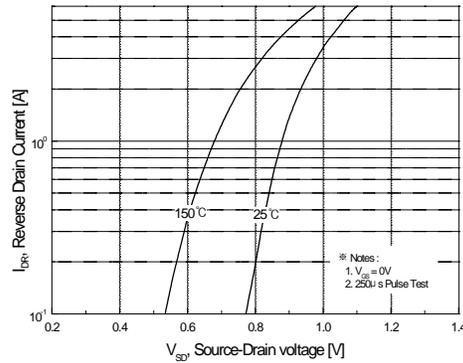


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

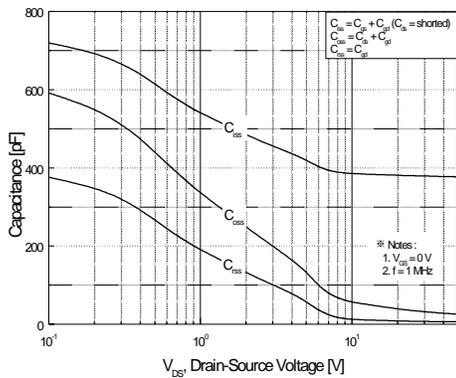


Figure 5. Capacitance Characteristics

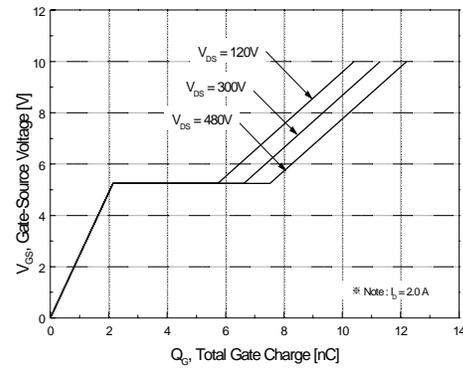


Figure 6. Gate Charge Characteristics

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Typical Characteristics (Continued)

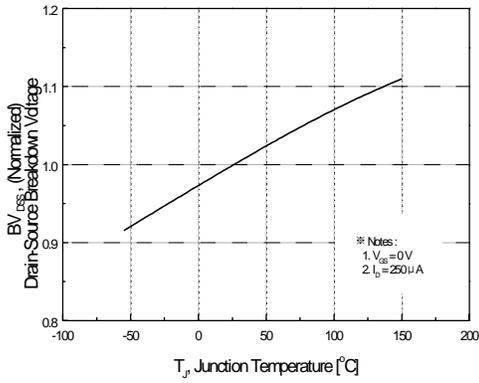


Figure 7. Breakdown Voltage Variation vs Temperature

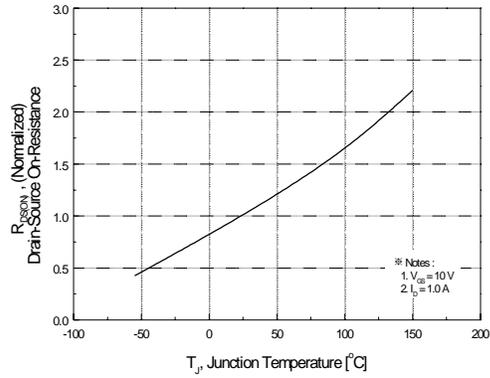


Figure 8. On-Resistance Variation vs Temperature

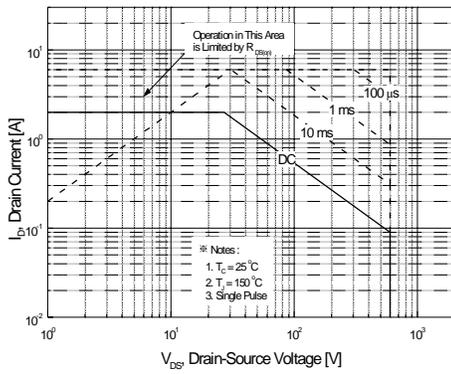


Figure 9-1. Maximum Safe Operating Area for SSP2N60B

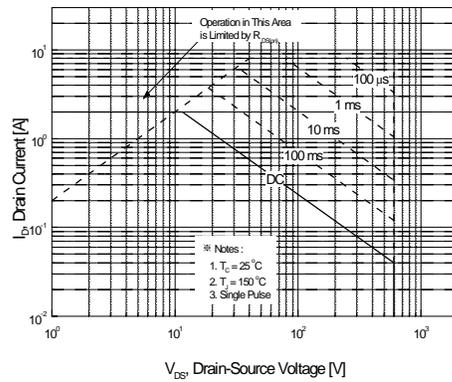


Figure 9-2. Maximum Safe Operating Area for SSS2N60B

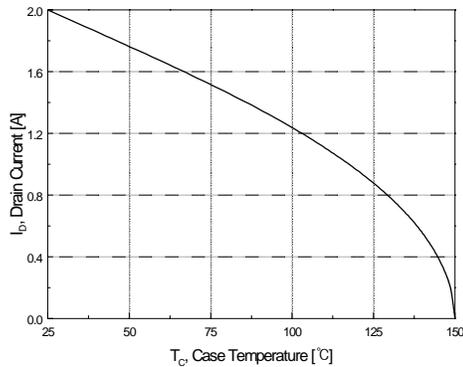


Figure 10. Maximum Drain Current vs Case Temperature

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Typical Characteristics (Continued)

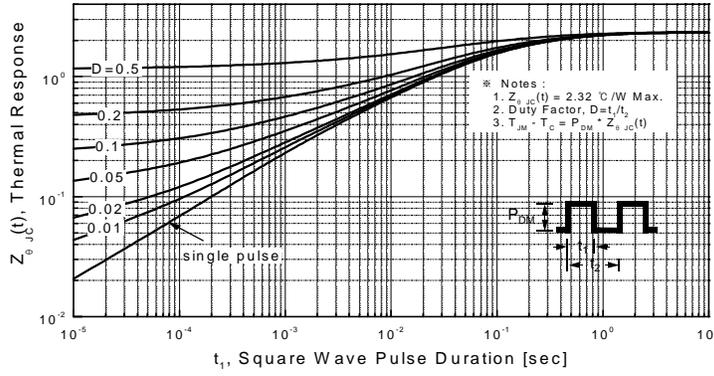


Figure 11-1. Transient Thermal Response Curve for SSP2N60B

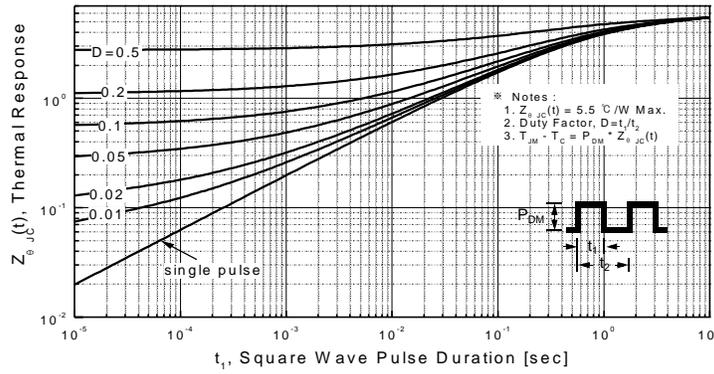
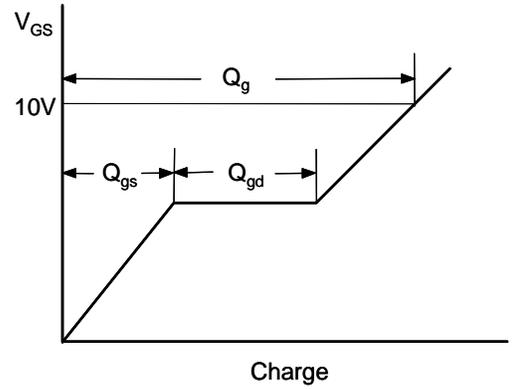
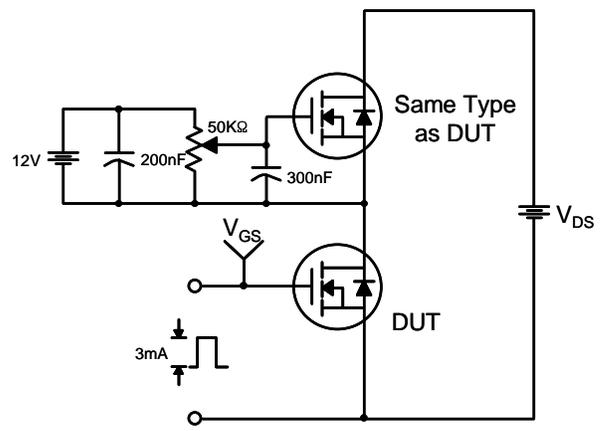


Figure 11-2. Transient Thermal Response Curve for SSS2N60B

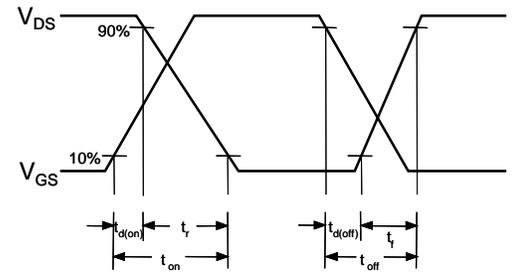
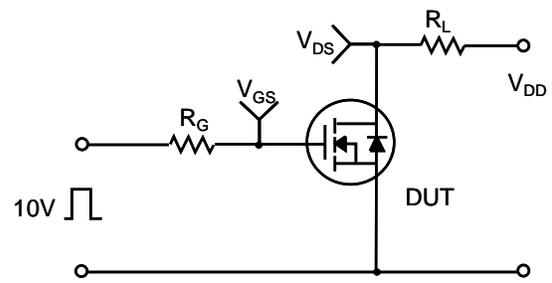
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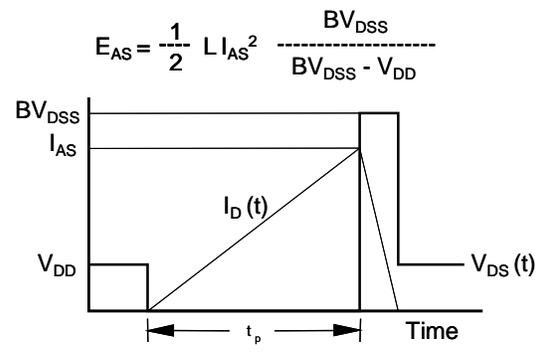
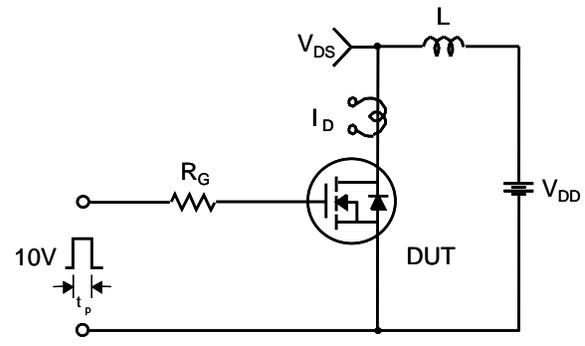
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



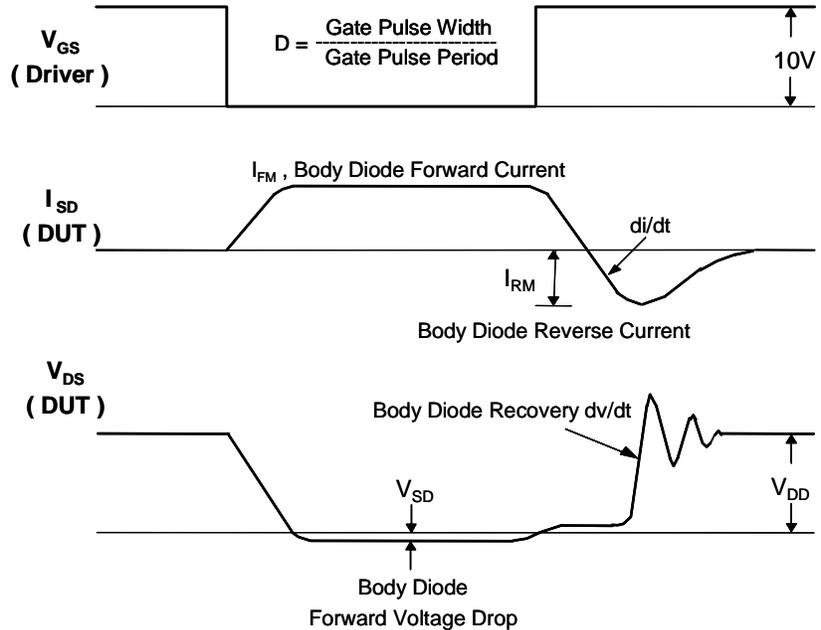
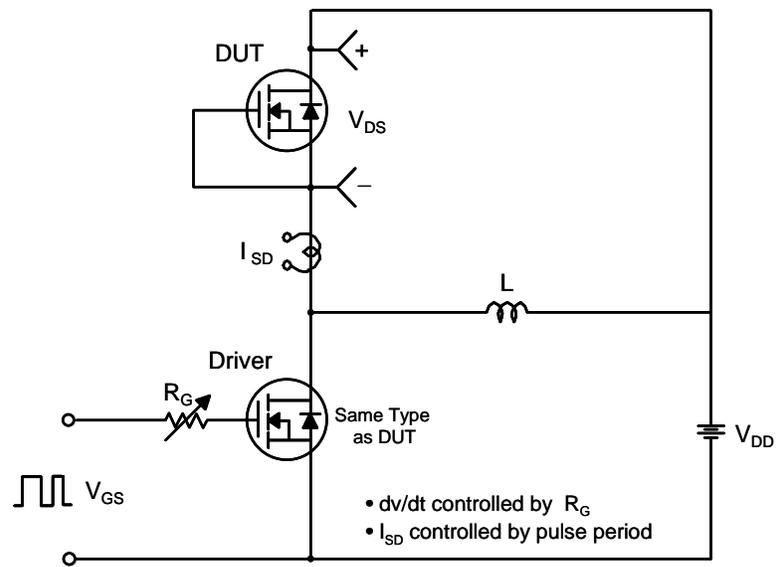
Unclamped Inductive Switching Test Circuit & Waveforms



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Peak Diode Recovery dv/dt Test Circuit & Waveforms



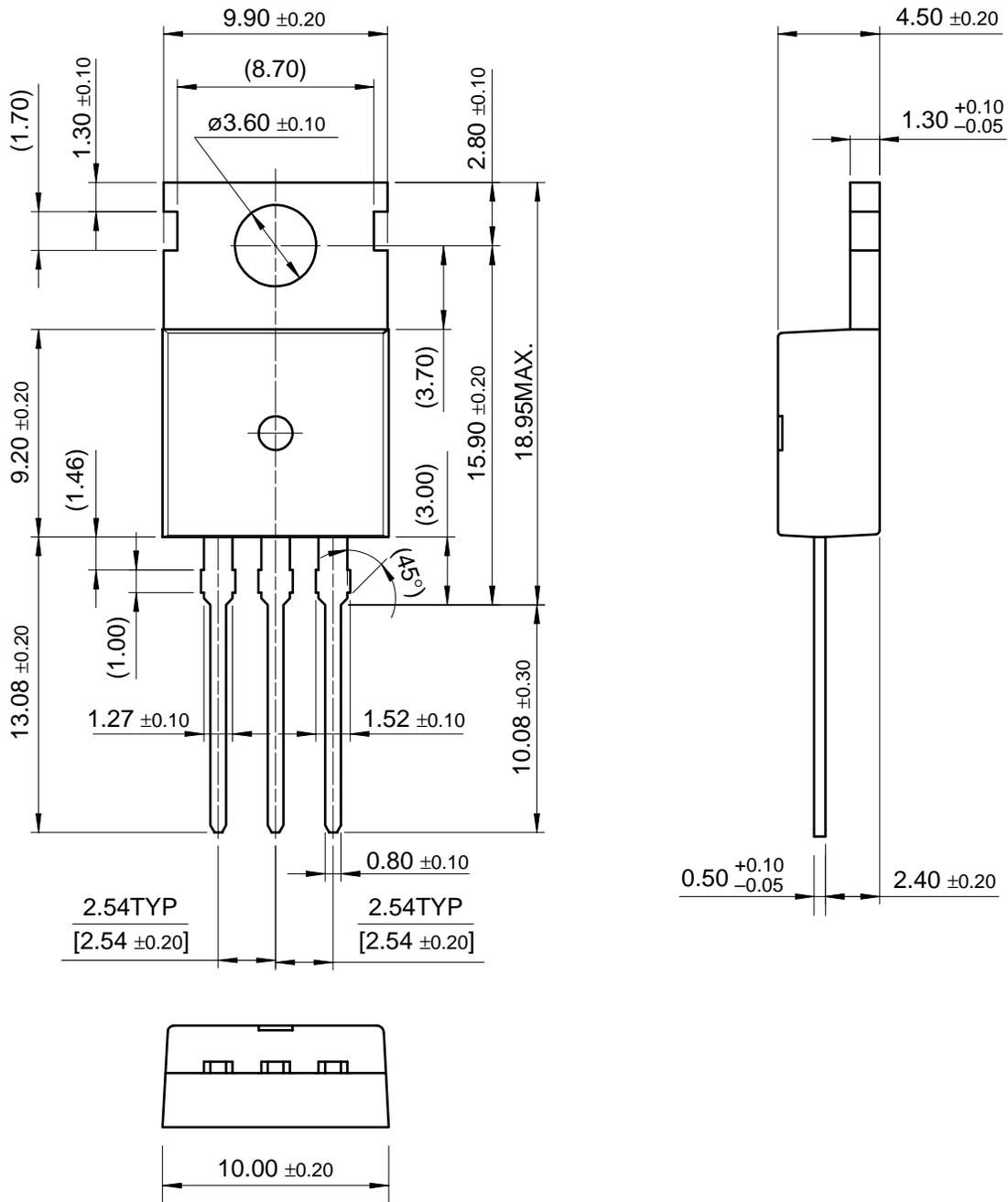
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Package Dimensions

TO-220

SSP2N60B/SSS2N60B



Dimensions in Millimeters

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