FAIRCHILD SEMICONDUCTOR®

February 2008

FDT55AN06LA0

N-Channel PowerTrench® MOSFET

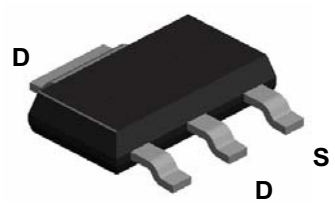
60V, 11A, 55mΩ

Features

- $R_{DS(on)}$ = 44mΩ (Typ.)@ V_{GS} = 5V, I_D = 11A
- $Q_{g(tot)}$ = 7.6nC(Typ.),@ V_{GS} = 5V.
- Low Miller Charge
- Low Q_{RR} Body Diode
- UIS Capability
- RoHS compliant

Applications

- Motor / Body load control
- Power train management
- DC-AC converters
- Distributed power architectures and VRMs



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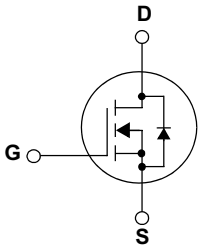


MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain to Source Voltage		60	V
V_{GSS}	Gate to Source Voltage		±20	V
I_D	Drain Current	-Continuous (T_C = 25°C, V_{GS} = 10V)	12.1	A
		-Continuous (T_C = 25°C, V_{GS} = 5V)	11	
		-Continuous (T_C = 10°C, V_{GS} = 5V)	7	
I_{DM}	Drain Current	- Pulsed (Note 1)	36	A
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	34	mJ
P_D	Power Dissipation	(T_C = 25°C)	8.9	W
		- Derate above 25°C	0.071	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	Ratings	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	14	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	100	

*When mounted on the minimum pad size recommended (PCB Mount)

Package Marking and Ordering Information $T_C = 25^oC$ unless otherwise noted

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDT55AN06LA0	FDT55AN06LA0	SOT-223	330mm	12mm	4000

Electrical Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250\mu A$, $V_{GS} = 0V$, $T_J = 25^oC$	60	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 50V$, $V_{GS} = 0V$	-	-	1	μA
		$V_{DS} = 50V$, $T_C = 150^oC$	-	-	250	
I_{GSS}	Gate to Body Leakage Current	$V_{GS} = \pm 20V$, $V_{DS} = 0V$	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250\mu A$	1.0	-	3.0	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10V$, $I_D = 11A$	-	36	46	mΩ
		$V_{DS} = 5V$, $I_D = 11A$		44	55	
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 25V$, $V_{GS} = 0V$, f = 1MHz	-	849	1130	pF
C_{oss}	Output Capacitance		-	88	115	pF
C_{rss}	Reverse Transfer Capacitance		-	37	55	pF
Switching Characteristics						
t_{ON}	Turn-On Time	$V_{DD} = 30V$, $I_D = 11A$, $V_{GS} = 5V$, $R_{GS} = 18\Omega$	-	34	78	ns
$t_{d(on)}$	Turn-On Delay Time		-	10	30	ns
t_r	Turn-On Rise Time		-	24	58	ns
$t_{d(off)}$	Turn-Off Delay Time		-	23	56	ns
t_f	Turn-Off Fall Time		-	12	34	ns
t_{OFF}	Turn-Off Time		-	35	80	ns
$Q_{g(tot)}$	Total Gate Charge at 10V	$V_{DS} = 30V$, $I_D = 11A$, $V_{GS} = 0V$ to 5V	-	7.6	10	nC
Q_{gs}	Gate to Source Gate Charge		-	2.8	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	2.7	-	nC
Drain-Source Diode Characteristics						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	12	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	36	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS} = 0V$, $I_{SD} = 11A$	-	-	1.25	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0V$, $I_{SD} = 11A$, $dI_F/dt = 100A/\mu s$	-	25	-	ns
Q_{rr}	Reverse Recovery Charge		-	27	-	nC

Notes:
1: Repetitive Rating: Pulse width limited by maximum junction temperature
2: L = 0.21mH, $I_{AS} = 18A$, $V_{DD} = 50V$, $R_G = 25\Omega$, Starting $T_J = 25°C$
3: $I_{SD} \le 11A$, $di/dt \le 200A/\mu s$, $V_{DD} \le BV_{DSS}$, Starting $T_J = 25°C$
4: Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 2%
5: Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

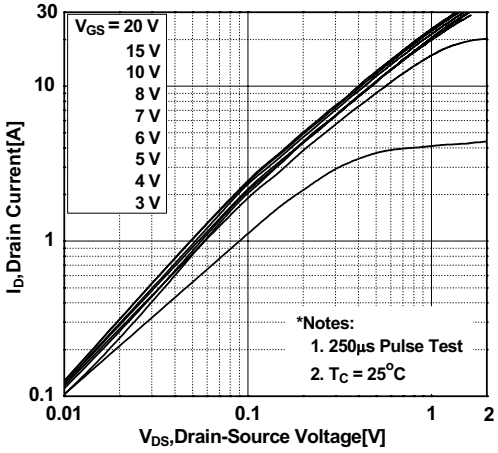


Figure 2. Transfer Characteristics

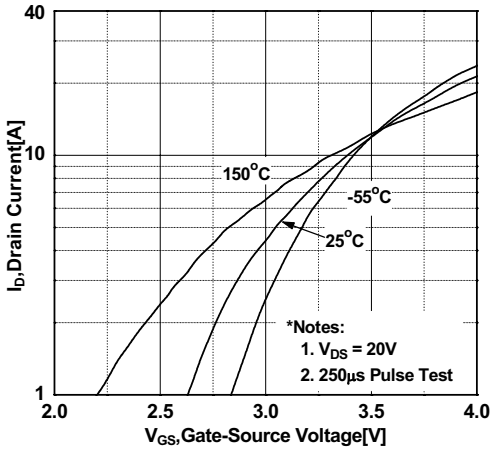


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

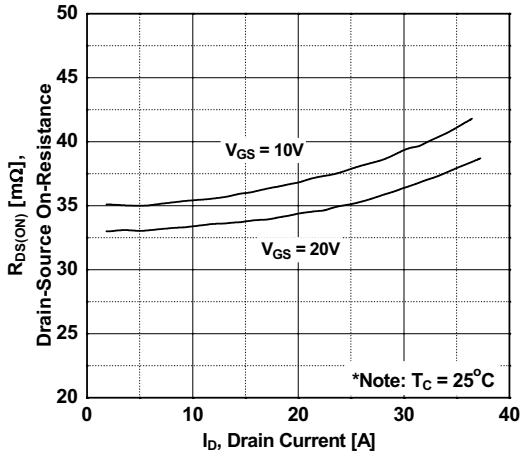


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

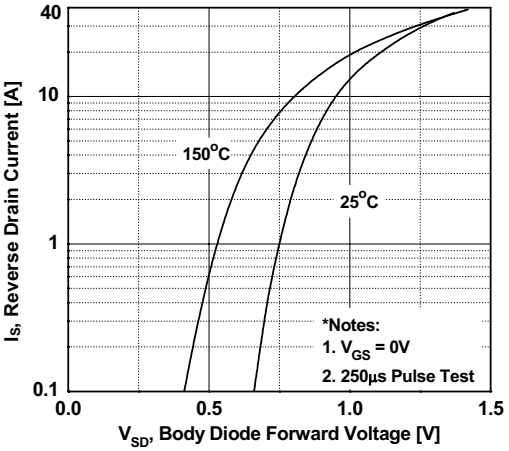


Figure 5. Capacitance Characteristics

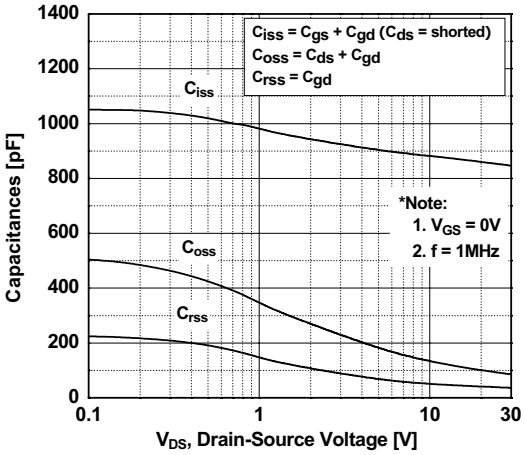
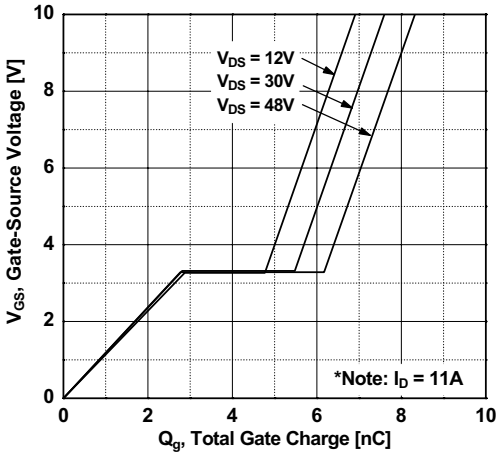


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

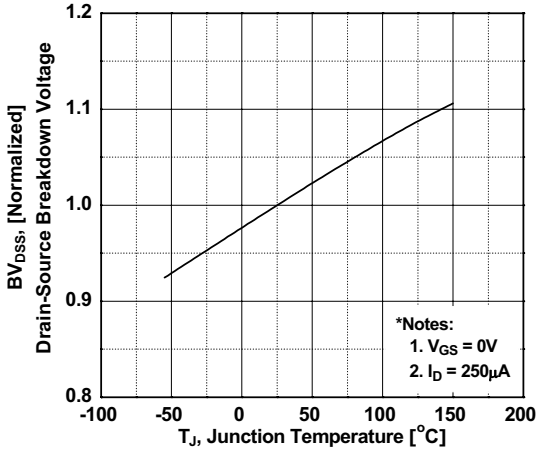


Figure 8. On-Resistance Variation vs. Temperature

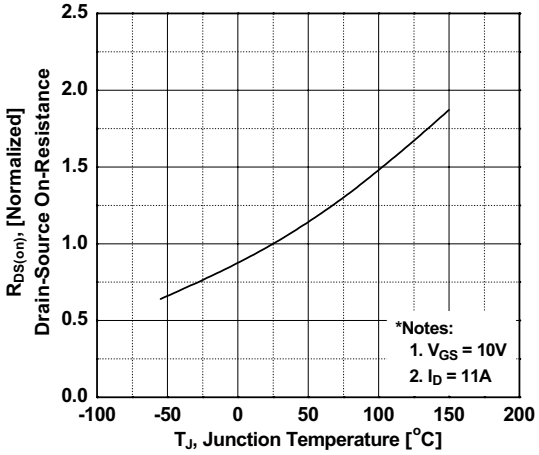


Figure 9. Maximum Safe Operating Area

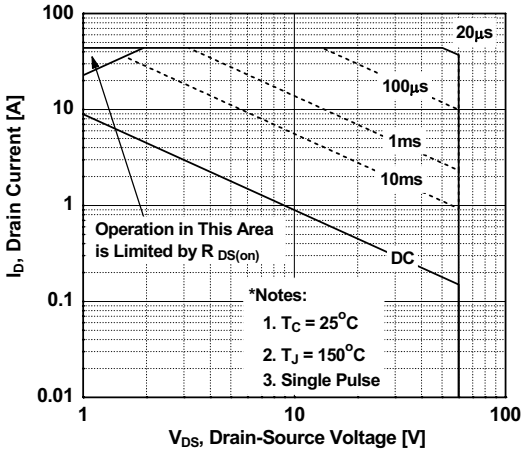


Figure 10. Maximum Drain Current vs. Case Temperature

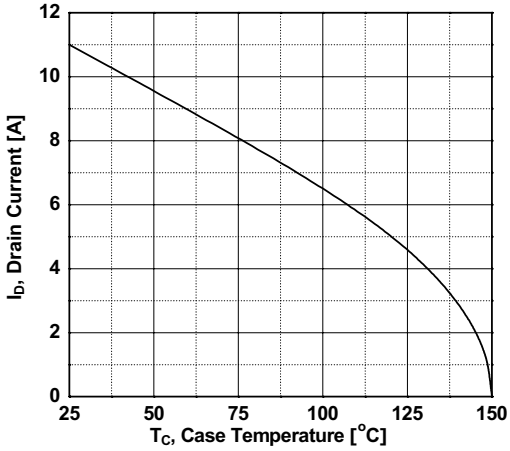
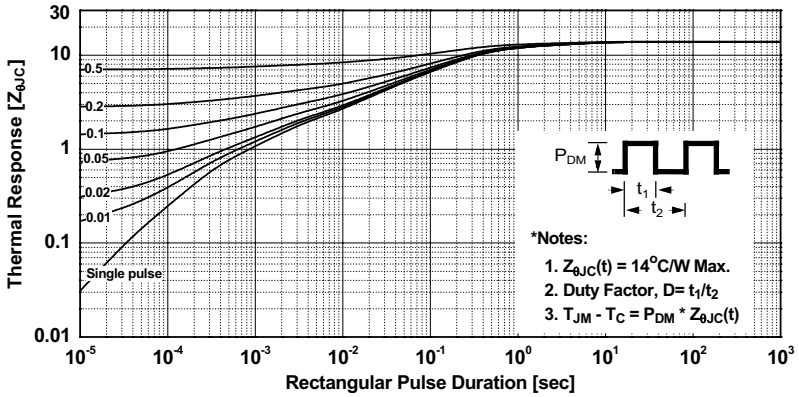
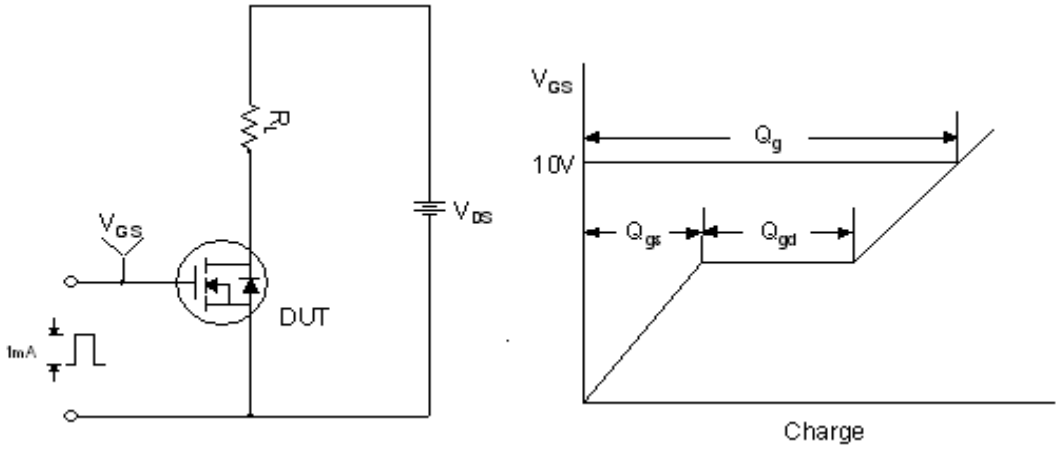


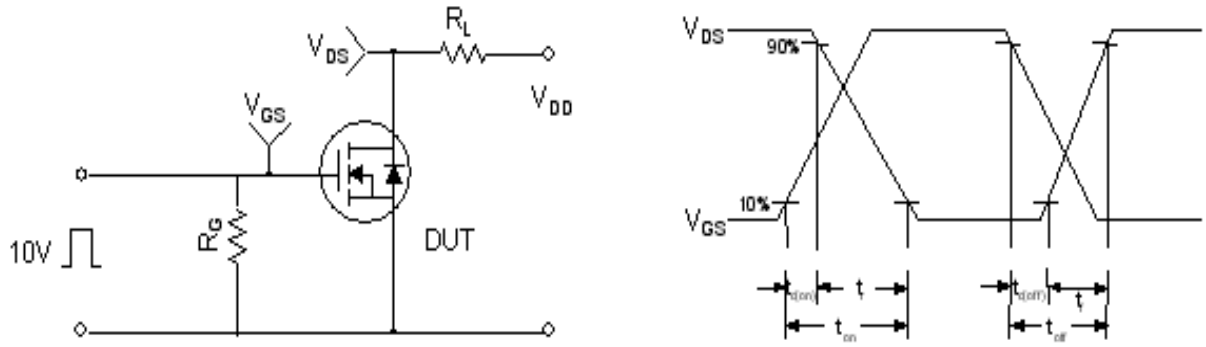
Figure 11. Transient Thermal Response Curve



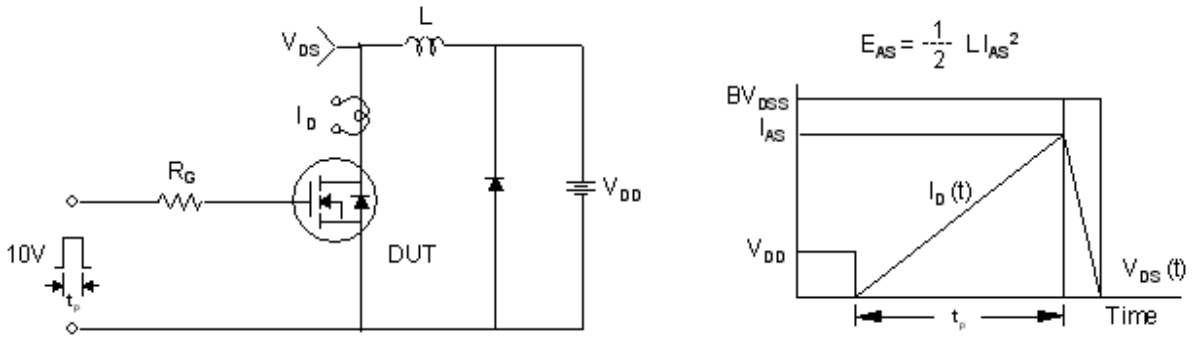
Gate Charge Test Circuit & Waveform



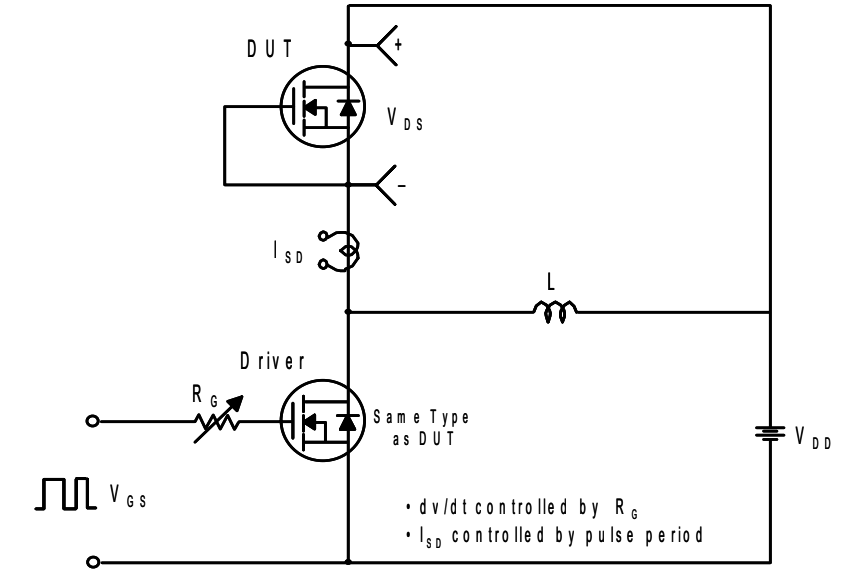
Resistive Switching Test Circuit & Waveforms

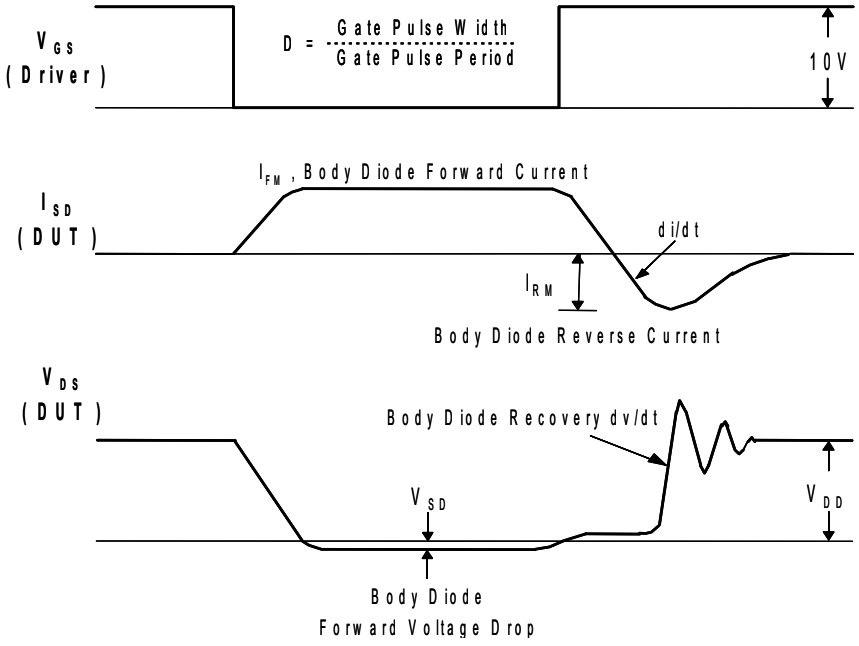


Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms





Mechanical Dimensions

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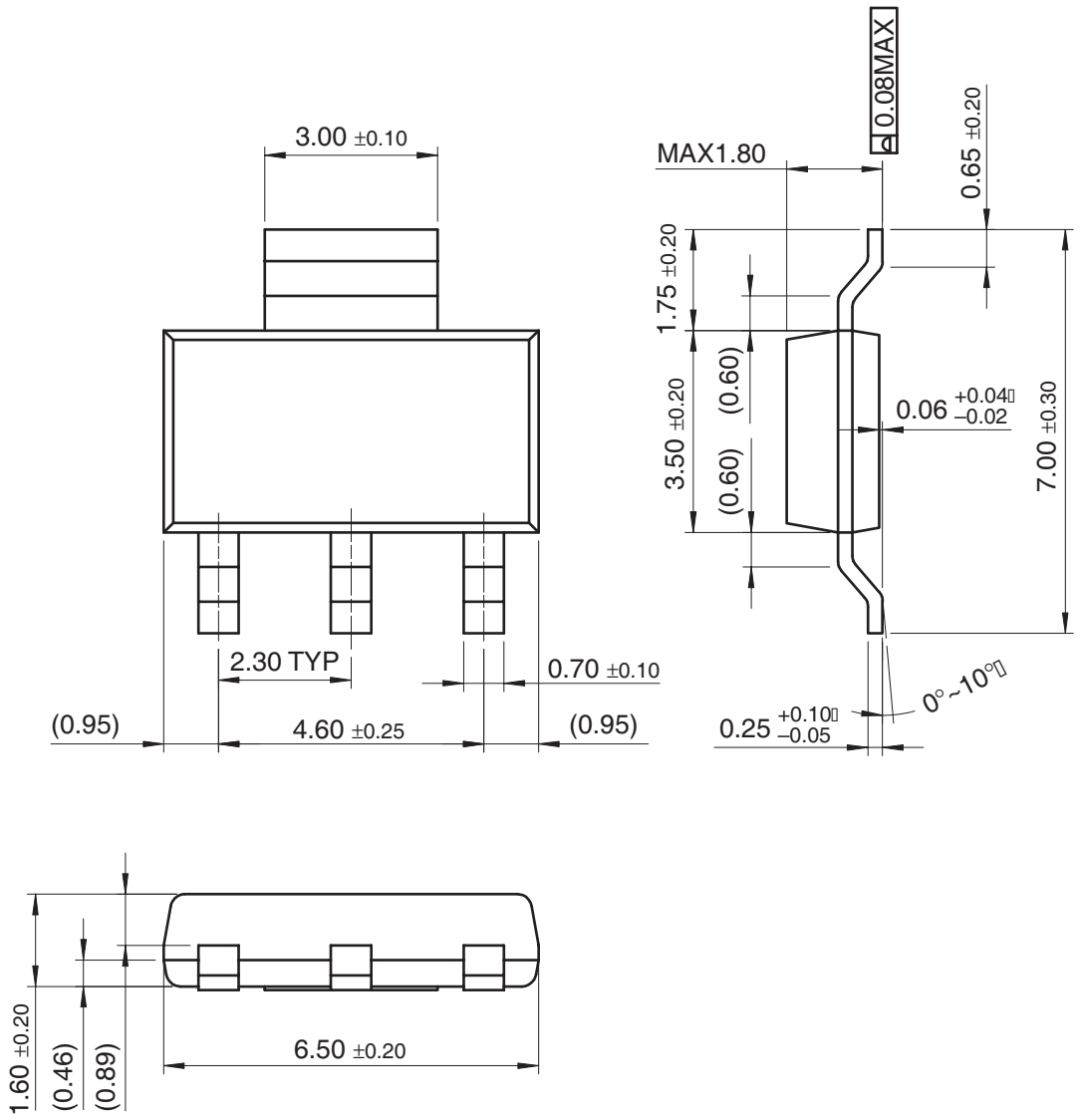

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