Advanced Power MOSFET

IRLR/U130A

FEATURES

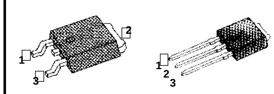
- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Lower Input Capacitance
- Improved Gate Charge
- Extended Safe Operating Area
- Lower Leakage Current: 10μA (Max.) @ V_{DS} = 100V
- Lower $R_{DS(ON)}$: 0.101Ω (Typ.)

BV_{DSS} = 100 V

$R_{DS(on)}$ = 0.12Ω

I_D = 13 A

D-PAK **I-PAK**



1. Gate 2. Drain 3. Source

Absolute Maximum Ratings

Symbol	Characteristic	Value	Units
V_{DSS}	Drain-to-Source Voltage	100	V
I_D	Continuous Drain Current (T_C=25°C)	13	A
	Continuous Drain Current (T_C=100°C)	8	
I_{DM}	Drain Current-Pulsed (1)	45	A
V_{GS}	Gate-to-Source Voltage	±20	V
E_{AS}	Single Pulsed Avalanche Energy (2)	225	mJ
I_{AR}	Avalanche Current (1)	13	A
E_{AR}	Repetitive Avalanche Energy (1)	4.6	mJ
dv/dt	Peak Diode Recovery dv/dt (3)	6.5	V/ns
P_D	Total Power Dissipation (T_A=25°C) *	2.5	W
	Total Power Dissipation (T_C=25°C)	46	W
	Linear Derating Factor	0.37	W/°C
T_J , T_{STG}	Operating Junction and Storage Temperature Range	- 55 to +150	°C
T_L	Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5-seconds	300	

Thermal Resistance

Symbol	Characteristic	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	--	2.7	°C/W
$R_{\theta JA}$	Junction-to-Ambient *	--	50	
$R_{\theta JA}$	Junction-to-Ambient	--	110	

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

Rev. B

FAIRCHILD SEMICONDUCTOR™

Electrical Characteristics (T_C=25°C unless otherwise specified)

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
BV_{DSS}	Drain-Source Breakdown Voltage	100	--	--	V	V_{GS}=0V,I_D=250μA
$\Delta BV/\Delta T_J$	Breakdown Voltage Temp. Coeff.	--	0.1	--	V/°C	I_D=250μA ***See Fig 7***
$V_{GS(th)}$	Gate Threshold Voltage	1.0	--	2.0	V	V_{DS}=5V,I_D=250μA
I_{GSS}	Gate-Source Leakage , Forward	--	--	100	nA	V_{GS}=20V
	Gate-Source Leakage , Reverse	--	--	-100		V_{GS}=-20V
I_{DSS}	Drain-to-Source Leakage Current	--	--	10	μA	V_{DS}=100V
		--	--	100		V_{DS}=80V,T_C=150°C
$R_{DS(on)}$	Static Drain-Source On-State Resistance	--	--	0.12	Ω	V_{GS}=5V,I_D=6.5A (4)
g_{fs}	Forward Transconductance	--	10.1	--	℧	V_{DS}=40V,I_D=6.5A (4)
C_{iss}	Input Capacitance	--	580	755	pF	V_{GS}=0V,V_{DS}=25V,f =1MHz ***See Fig 5***
C_{oss}	Output Capacitance	--	140	175		
C_{rss}	Reverse Transfer Capacitance	--	60	75		
$t_{d(on)}$	Turn-On Delay Time	--	10	30	ns	V_{DD}=50V,I_D=14A, R_G=6Ω ***See Fig 13*** (4) (5)
t_r	Rise Time	--	11	30		
$t_{d(off)}$	Turn-Off Delay Time	--	29	70		
t_f	Fall Time	--	15	40		
Q_g	Total Gate Charge	--	16.9	24	nC	V_{DS}=80V,V_{GS}=5V, I_D=14A ***See Fig 6 & Fig 12*** (4) (5)
Q_{gs}	Gate-Source Charge	--	2.7	--		
Q_{gd}	Gate-Drain (Miller) Charge	--	9.7	--		

Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
I_S	Continuous Source Current	--	--	13	A	Integral reverse pn-diode in the MOSFET
I_{SM}	Pulsed-Source Current (1)	--	--	45		
V_{SD}	Diode Forward Voltage (4)	--	--	1.5	V	T_J=25°C,I_S=13A,V_{GS}=0V
t_{rr}	Reverse Recovery Time	--	109	--	ns	T_J=25°C,I_F=14A di_F/dt=100A/μs (4)
Q_{rr}	Reverse Recovery Charge	--	0.41	--	μC	

Notes;

(1) Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
(2) L=2mH, I_{AS}=13A, V_{DD}=25V, R_G=27Ω, Starting T_J =25°C
(3) $I_{SD} \leq$ 14A, di/dt ≤ 350A/μs, $V_{DD} \leq BV_{DSS}$, Starting T_J =25°C
(4) Pulse Test: Pulse Width = 250μs, Duty Cycle ≤ 2%
(5) Essentially Independent of Operating Temperature

Fig 1. Output Characteristics

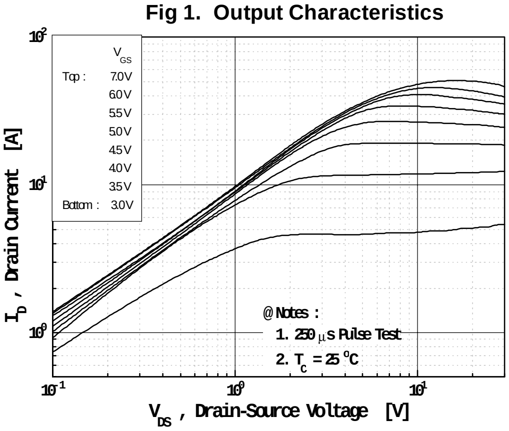


Fig 2. Transfer Characteristics

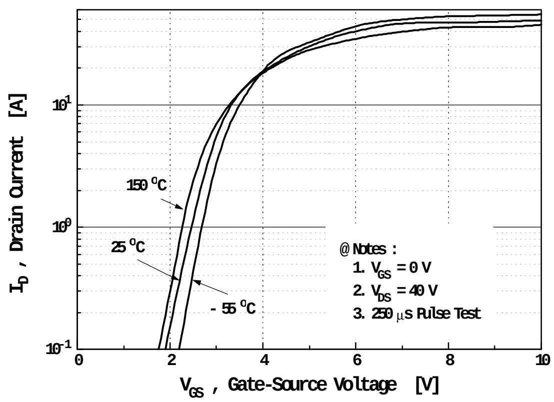


Fig 3. On-Resistance vs. Drain Current

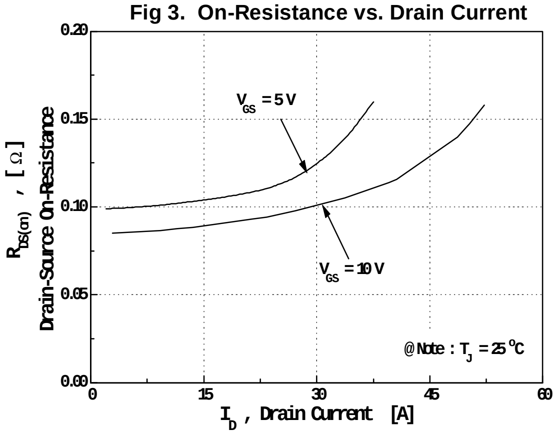


Fig 4. Source-Drain Diode Forward Voltage

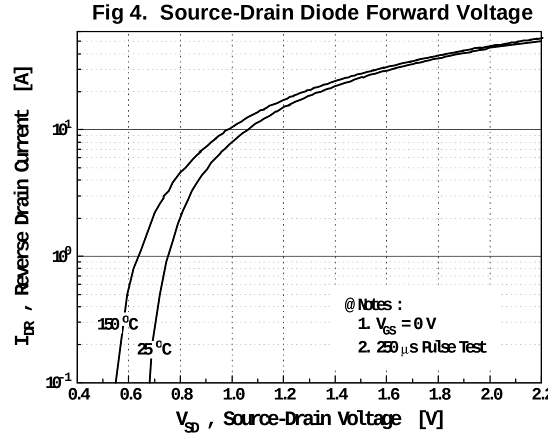


Fig 5. Capacitance vs. Drain-Source Voltage

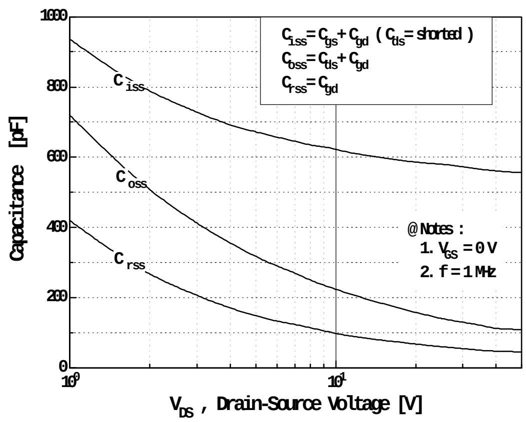


Fig 6. Gate Charge vs. Gate-Source Voltage

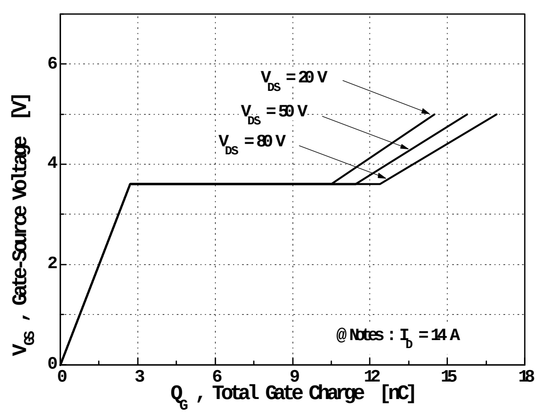


Fig 7. Breakdown Voltage vs. Temperature

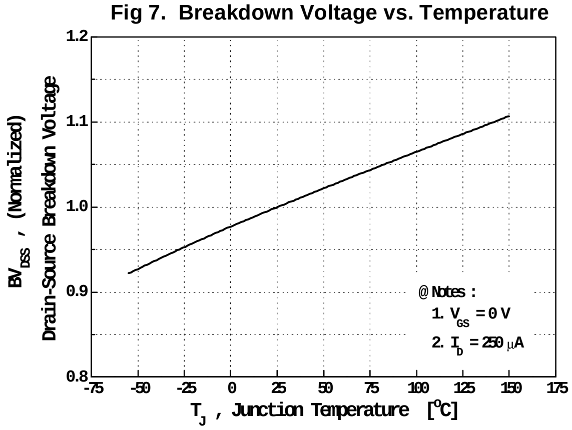


Fig 8. On-Resistance vs. Temperature

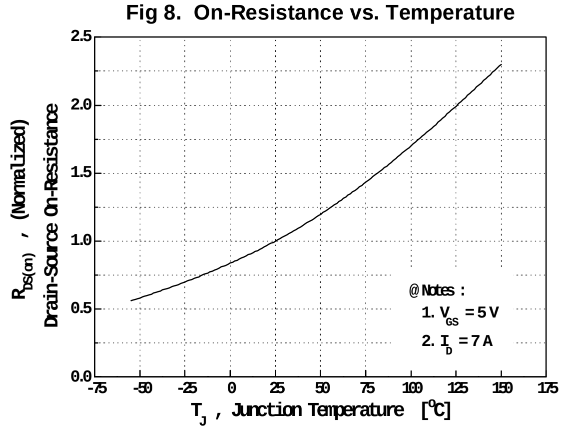


Fig 9. Max. Safe Operating Area

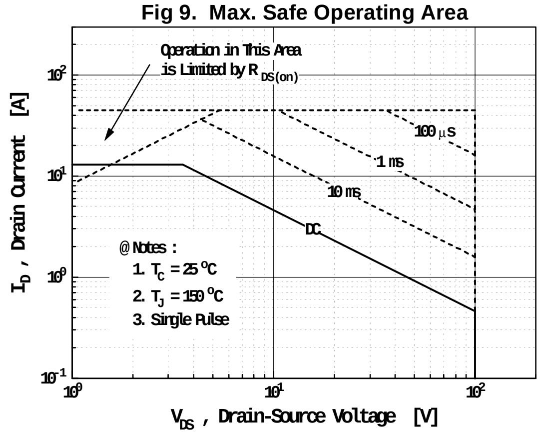


Fig 10. Max. Drain Current vs. Case Temperature

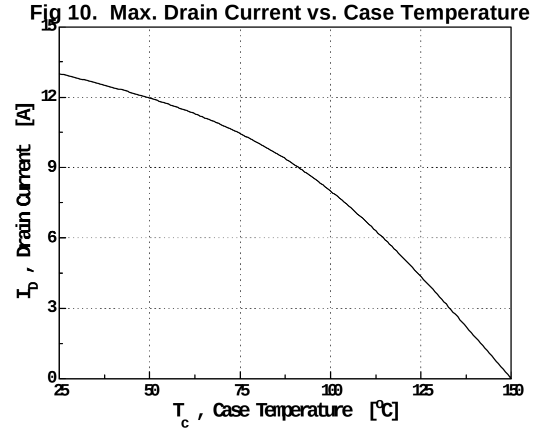


Fig 11. Thermal Response

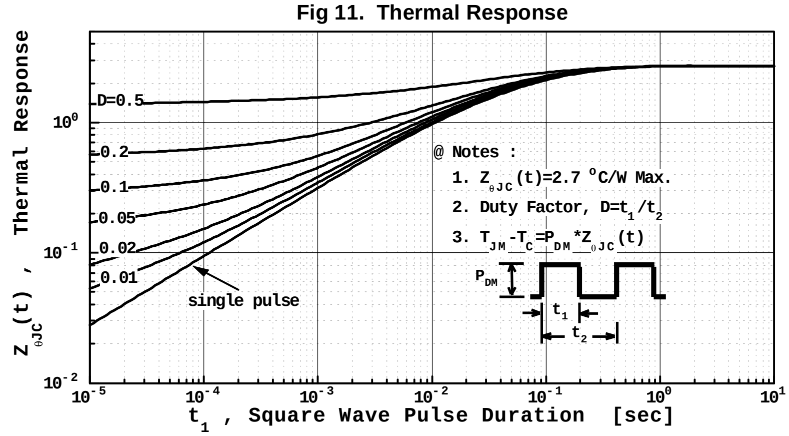


Fig 12. Gate Charge Test Circuit & Waveform

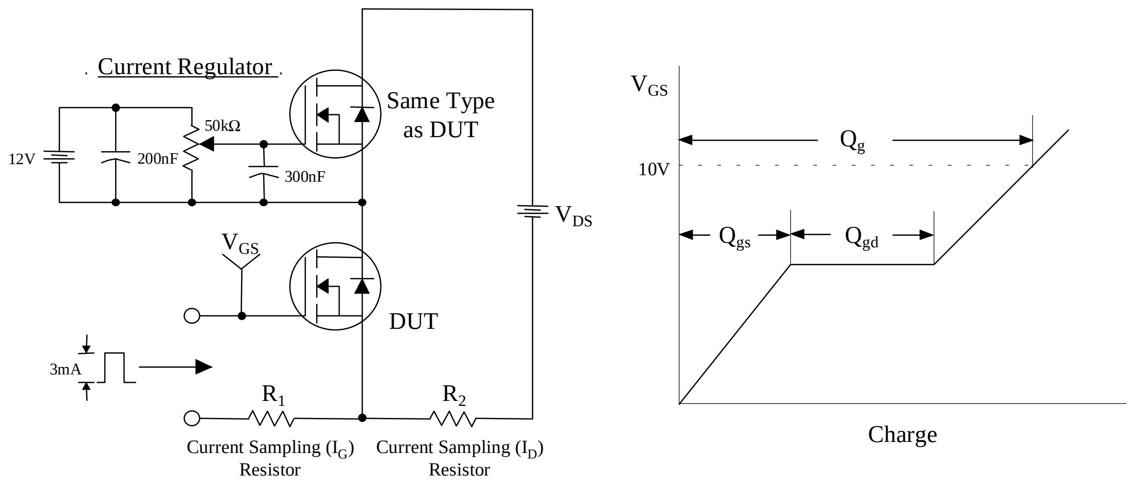


Fig 13. Resistive Switching Test Circuit & Waveforms

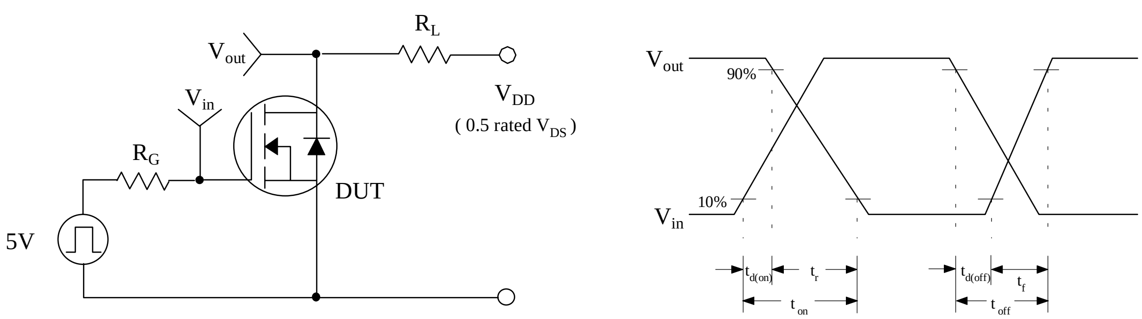


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

$$E_{AS} = \frac{1}{2} L_L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

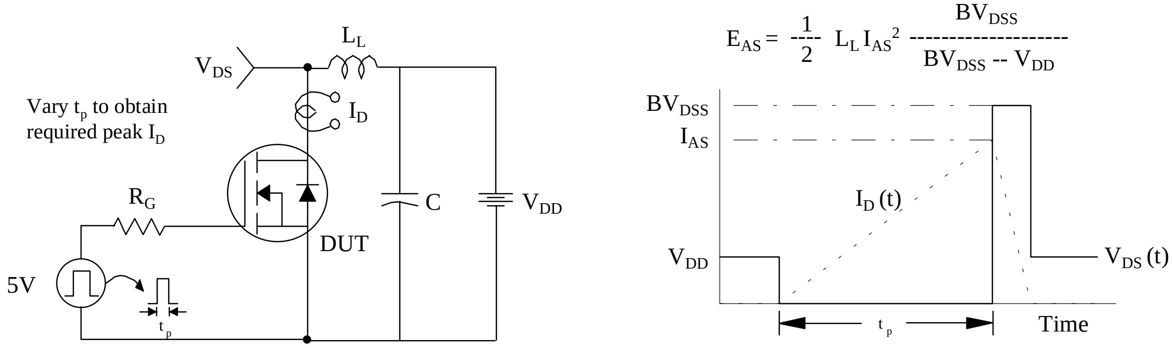
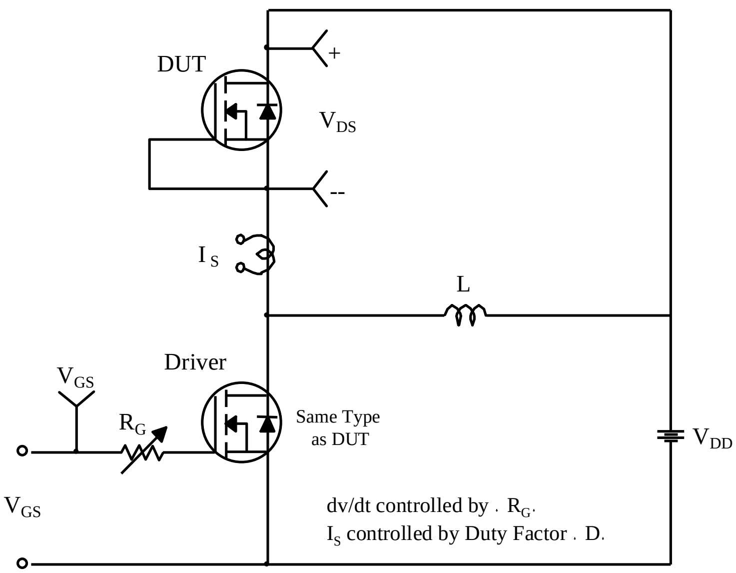
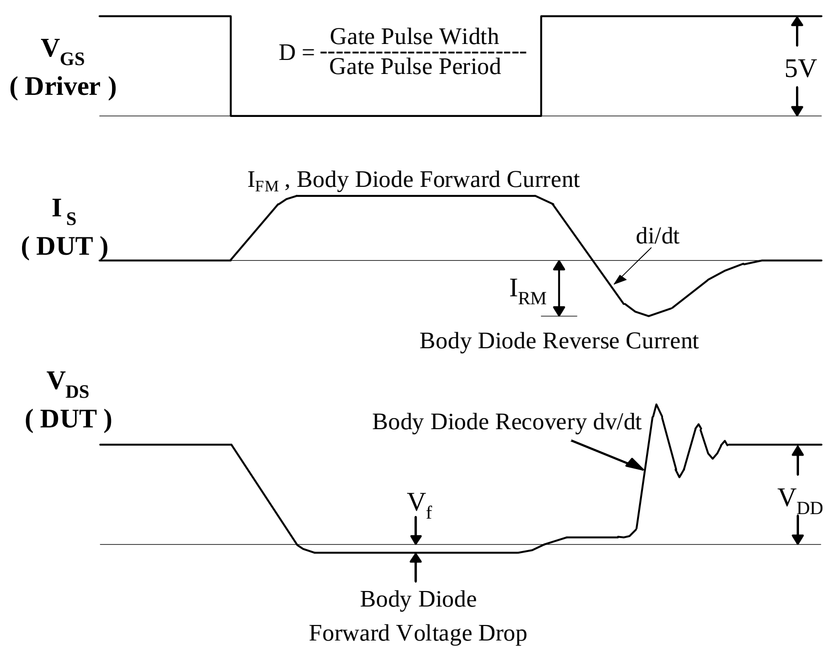


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms





DPAK Package Dimensions

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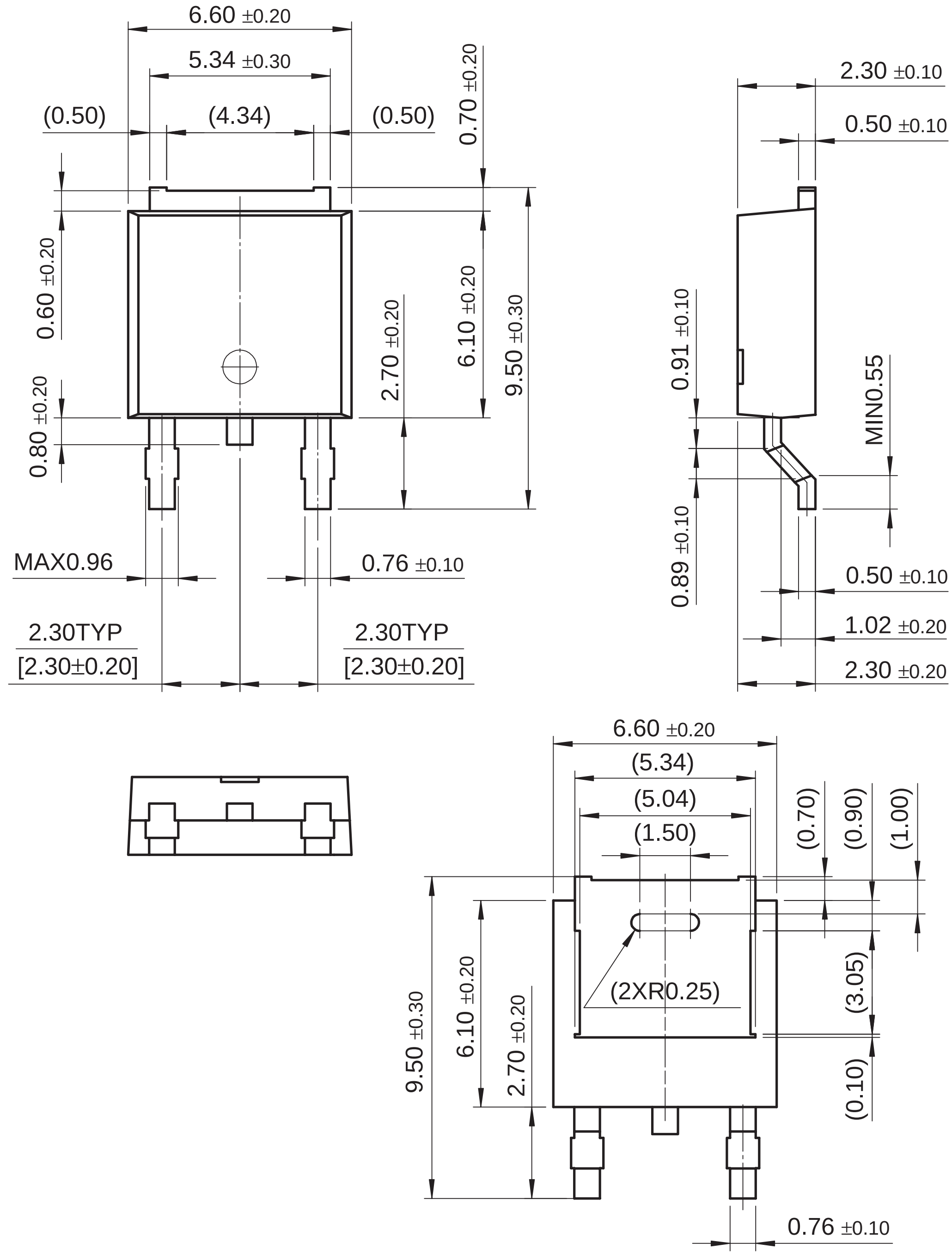
SEMICONDUCTOR TM

DPAK (FS PKG CODE AA)



Dimensions in Millimeters

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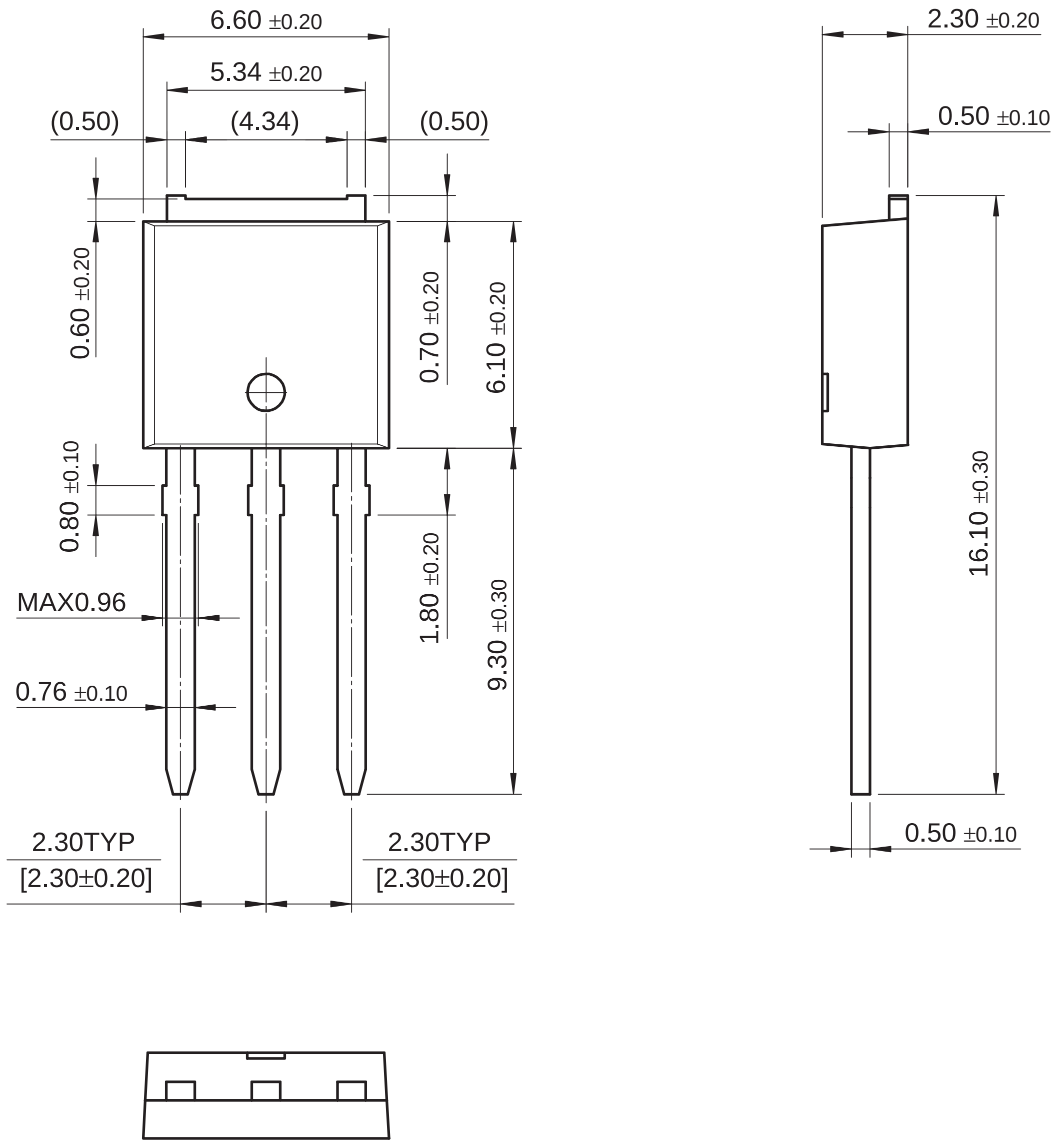
IPAK (FS PKG CODE AL)



Dimensions in Millimeters

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