VFET™

Wisdom **Semiconductor**

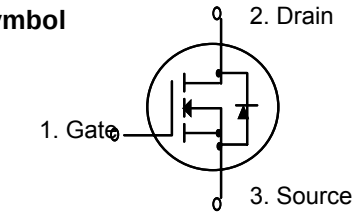
WFD430/WFU430

N-Channel MOSFET

Features

- $R_{DS(on)}$ (Max 1.4 Ω)@V_{GS}=10V
- Gate Charge (Typical 25nC)
- Improved dv/dt Capability, High Ruggedness
- 100% Avalanche Tested
- Maximum Junction Temperature Range (150°C)

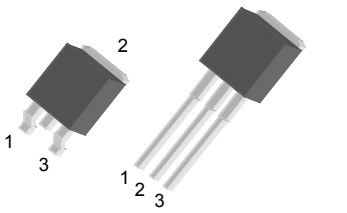
Symbol



General Description

This Power MOSFET is produced using Wisdom's advanced planar stripe, DMOS technology. This latest technology has been especially designed to minimize on-state resistance, have a high rugged avalanche characteristics. These devices are well suited for high efficiency switching DC/DC converters, switch mode power supply, DC-AC converters for uninterruped power supply, motor control.

D-PAK, I-PAK



Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{DSS}	Drain to Source Voltage	500	V
I_D	Continuous Drain Current(@T_C = 25°C)	4.0	A
	Continuous Drain Current(@T_C = 100°C)	2.4	A
I_{DM}	Drain Current Pulsed (Note 1)	16	A
V_{GS}	Gate to Source Voltage	±30	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	292	mJ
E_{AR}	Repetitive Avalanche Energy (Note 1)	4.8	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5.5	V/ns
P_D	Total Power Dissipation(@T_C = 25 °C)	48	W
	Derating Factor above 25 °C	0.38	W/°C
T_{STG}, T_J	Operating Junction Temperature & Storage Temperature	- 55 ~ 150	°C
T_L	Maximum Lead Temperature for soldering purpose, 1/8 from Case for 5 seconds.	300	°C

Thermal Characteristics

Symbol	Parameter	Value			Units
		Min.	Typ.	Max.	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	-	-	2.6	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient *	-	-	50	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	-	-	110	°C/W

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

Electrical Characteristics

T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	500	--	--	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	--	0.50	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 500 V, V_{GS} = 0 V	--	--	10	μA
		V_{DS} = 400 V, T_C = 125°C	--	--	100	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 2.0 A (Note 4)	--	1.15	1.40	Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	680	900	pF
C_{oss}	Output Capacitance		--	85	110	pF
C_{rss}	Reverse Transfer Capacitance		--	15	20	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 250V, I_D = 5.0 A, R_G = 25 Ω (Note 4, 5)	--	20	50	ns
t_r	Turn-On Rise Time		--	40	90	ns
$t_{d(off)}$	Turn-Off Delay Time		--	90	190	ns
t_f	Turn-Off Fall Time		--	45	100	ns
Q_g	Total Gate Charge	V_{DS} = 400 V, I_D = 5.0A, V_{GS} = 10 V (Note 4, 5)	--	25	33	nC
Q_{gs}	Gate-Source Charge		--	5	--	nC
Q_{gd}	Gate-Drain Charge		--	10	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	4.0	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	16	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 4.0 A	--	--	1.5	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 5.0 A, dI_F / dt = 100 A/μs (Note 4)	--	250	--	ns
Q_{rr}	Reverse Recovery Charge		--	2.2	--	μC

Notes:
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 21.0mH, I_{AS} = 5.0A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C
3. I_{SD} ≤ 5.0A, di/dt ≤ 300μA/s, 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

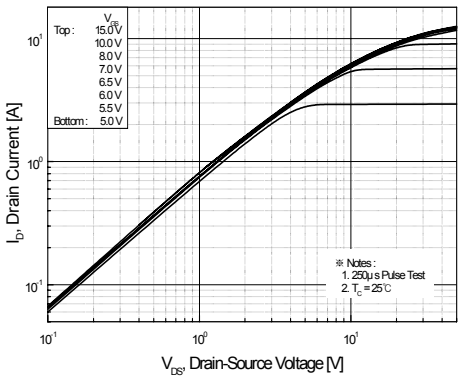


Figure 1. On-Region Characteristics

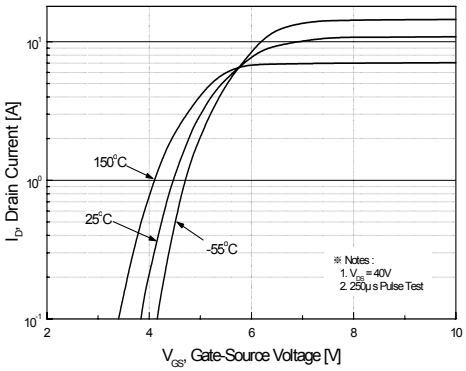


Figure 2. Transfer Characteristics

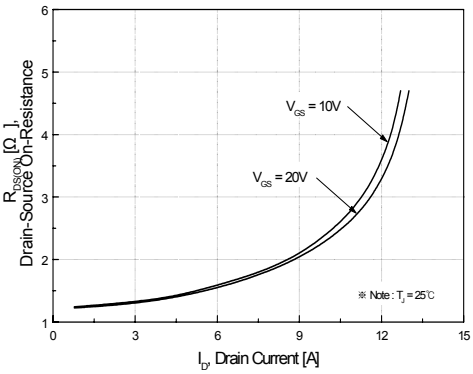


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

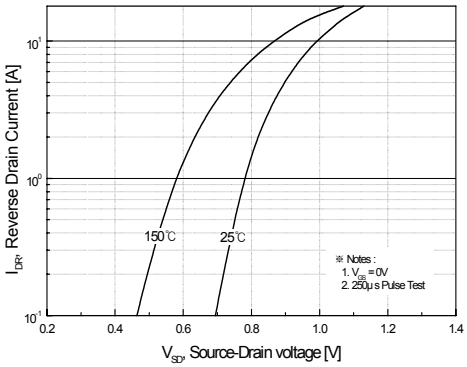


Figure 4. Body Diode Forward Voltage Variation with Source Current

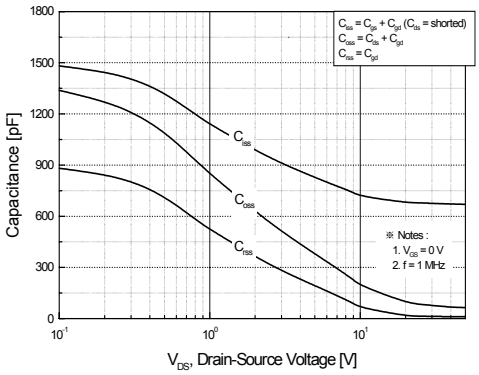


Figure 5. Capacitance Characteristics

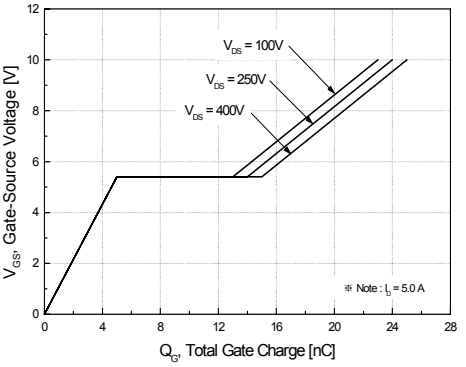


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

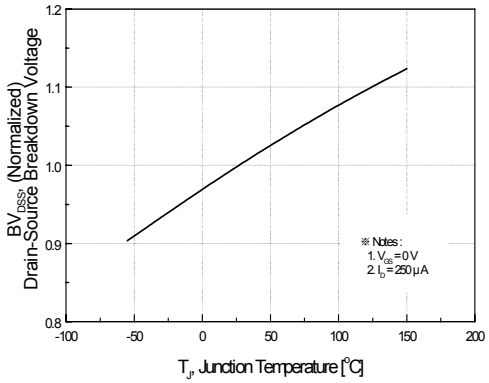


Figure 7. Breakdown Voltage Variation

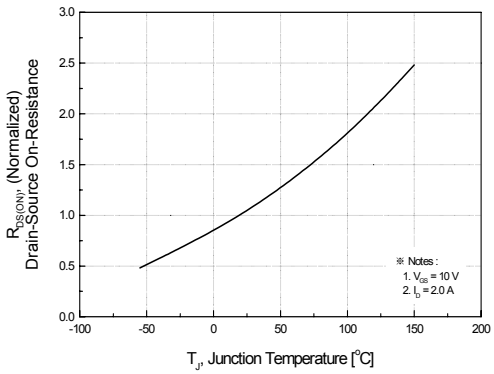


Figure 8. On-Resistance Variation vs Temperature

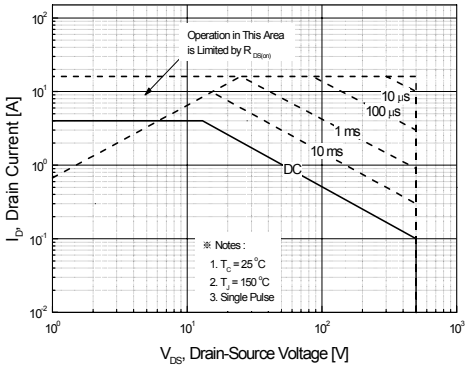


Figure 9. Maximum Safe Operating Area

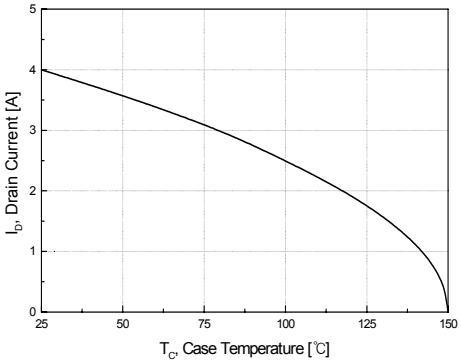


Figure 10. Maximum Drain Current vs Case Temperature

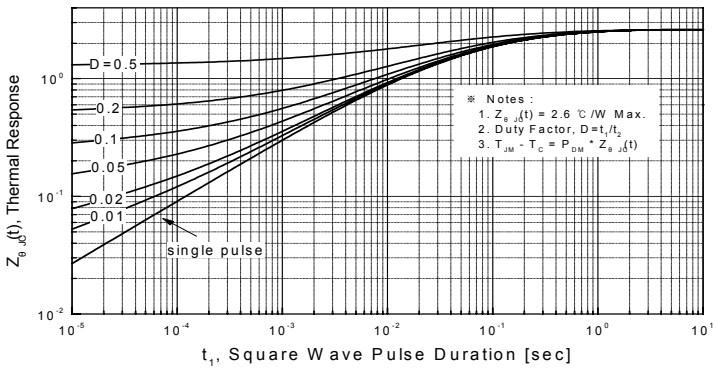
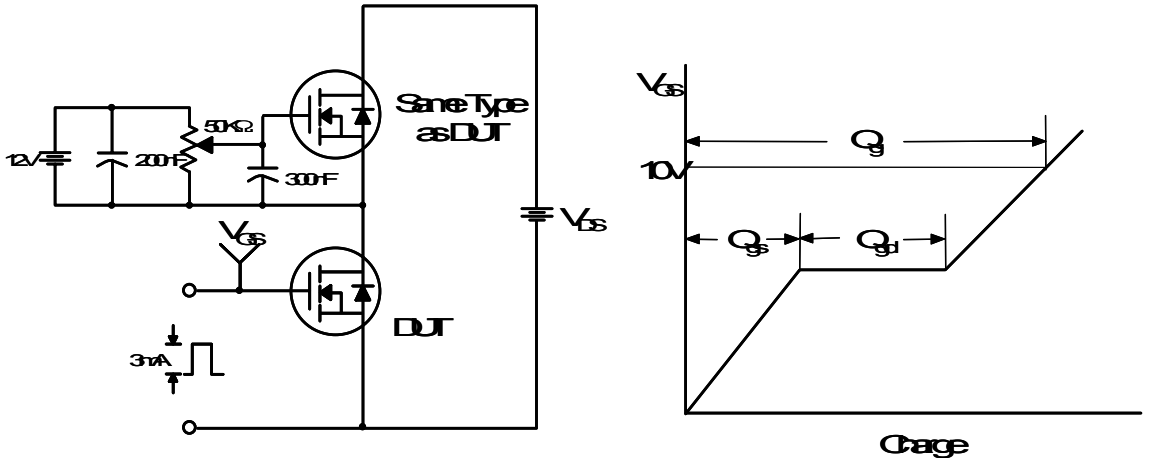
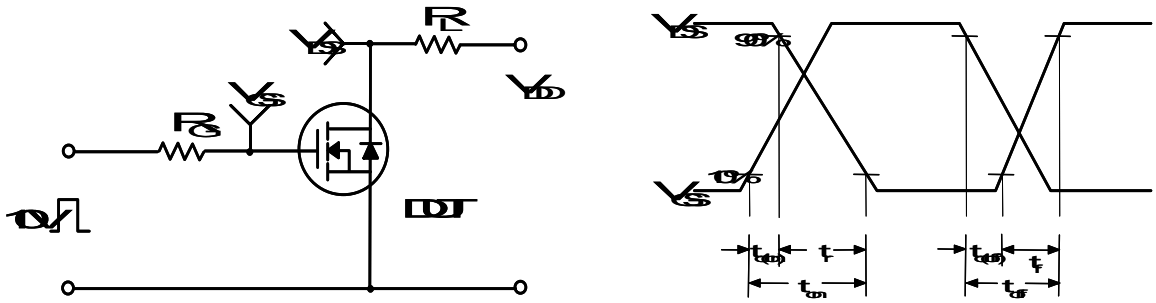


Figure 11. Transient Thermal Response Curve

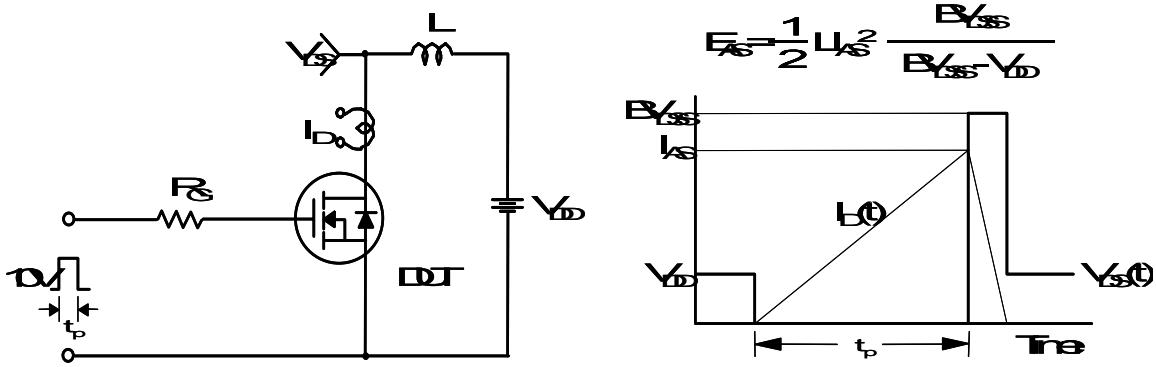
Gate Charge Test Circuit & Waveform



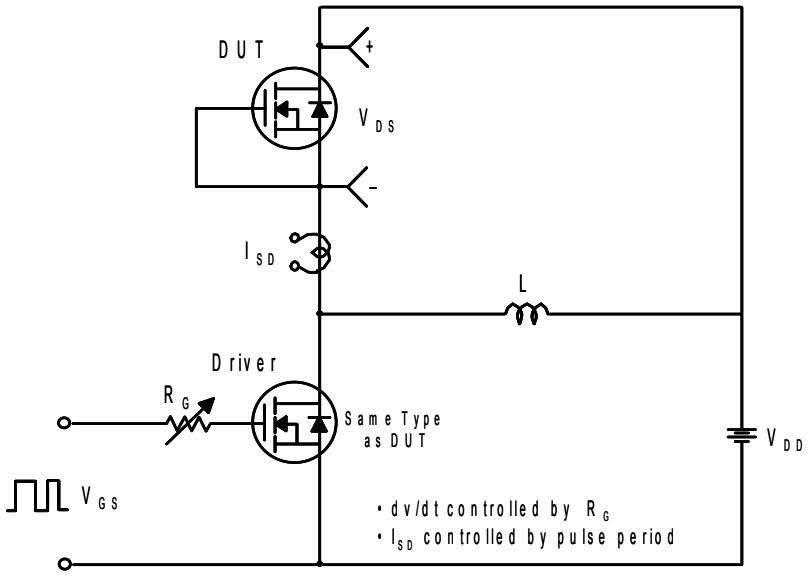
Resistive Switching Test Circuit & Waveforms

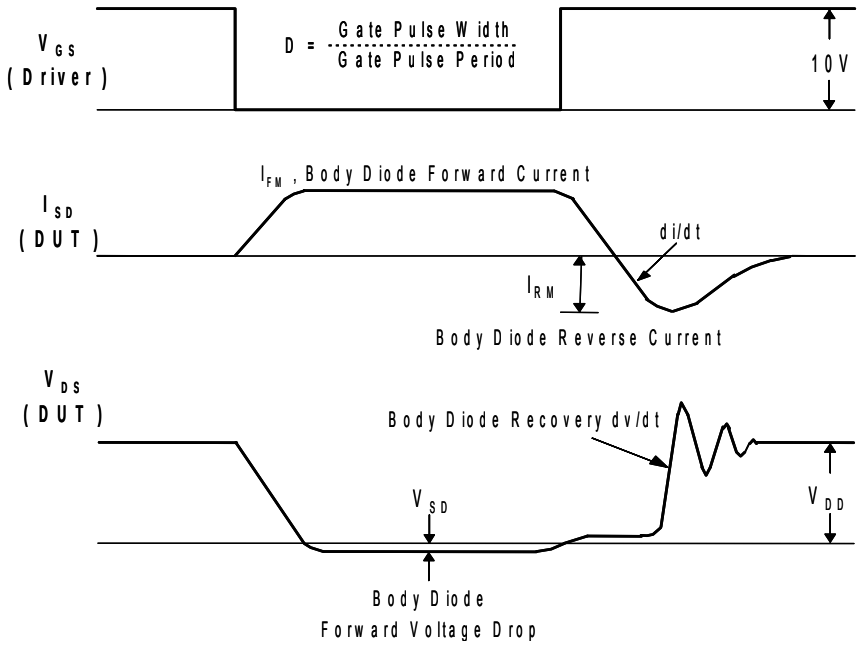


Unclamped Inductive Switching Test Circuit & Waveforms



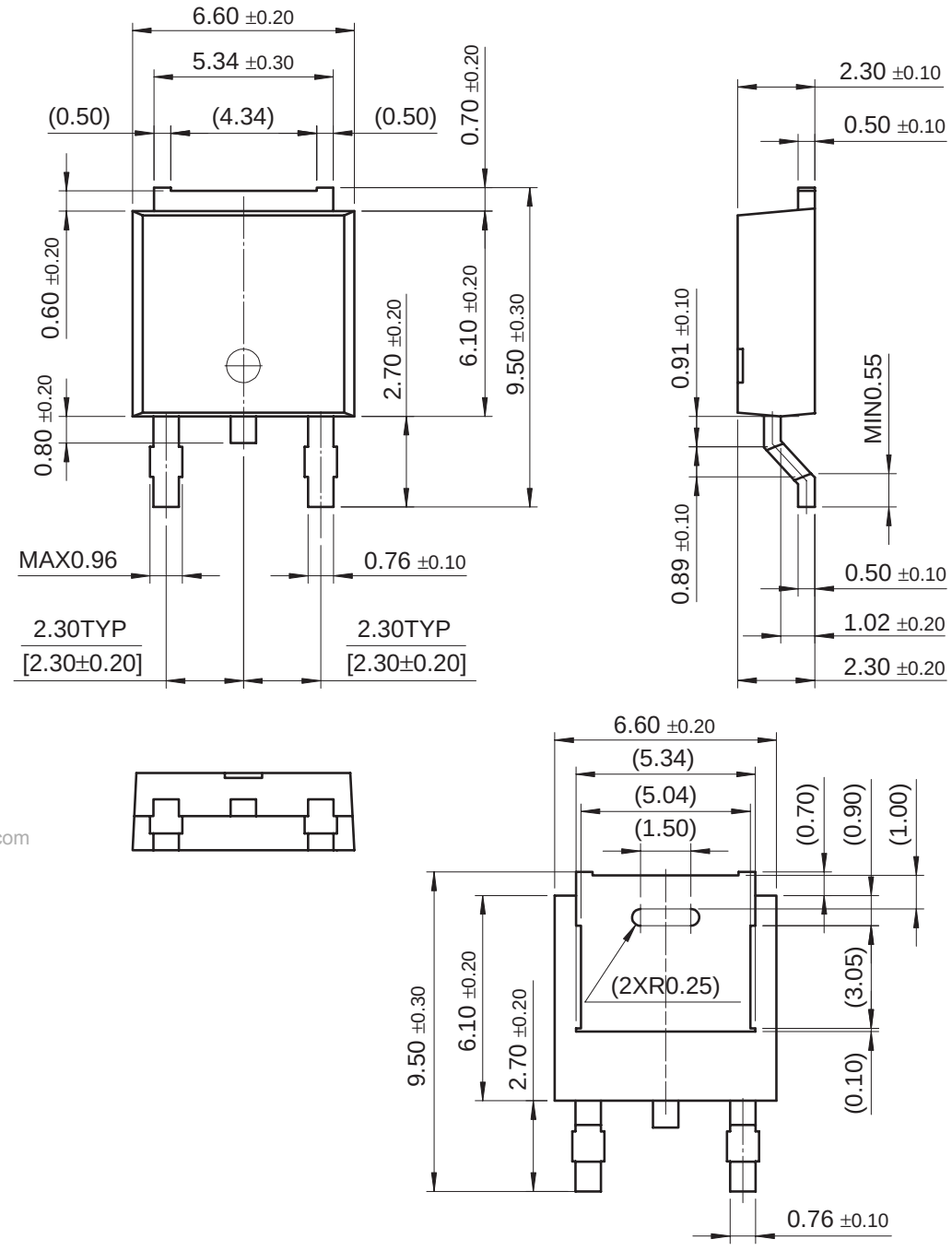
Peak Diode Recovery dv/dt Test Circuit & Waveforms





Package Dimensions

DPAK



Package Dimensions **(Continued)**

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