

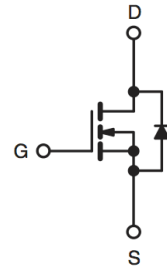
## GENERAL DESCRIPTION

The MS40N20 is a N-channel enhancement-mode MOSFET , providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness. The TO-220 package is universally preferred for all commercial-industrial applications

## TO-220



1. Gate 2. Drain 3. Source



## FEATURES

- Low On Resistance
- Low Thermal Impedence
- Fast Switching Speed
- RoHS compliant / Halogen free package available

## APPLICATION

- White LED boost converters
- Automotive Systems
- Industrial DC/DC Conversion Circuits

PRODUCT SUMMARY		
VDS (V)	rDS(on) (mΩ)	ID(A)
200	180 @ VGS = 10V	34A
	340 @ VGS = 5.5V	

ABSOLUTE MAXIMUM RATINGS (TA = 25°C UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Units
Drain-Source Voltage		VDS	200	V
Gate-Source Voltage		VGS	±20	
Continuous Drain Current a	TA=25°C	ID	34	A
Pulsed Drain Current b		IDM	80	
Continuous Source Current (Diode Conduction) a		IS	20	A
Power Dissipation a	TA=25°C	PD	300	W
Operating Junction and Storage Temperature Range		TJ, Tstg	-55 to 150	°C

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	Maximum	Units
Maximum Junction-to-Ambient a	RθJA	62.5	°C/W
Maximum Junction-to-Case	RθJC	1	



# MS40N20 200V N-Channel MOSFET

Electrical Characteristics						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Gate-Source Threshold Voltage	VGS(th)	VDS = VGS, ID = 250 $\mu$ A	1			V
Gate-Body Leakage	IGSS	VDS = 0 V, VGS = $\pm$ 20 V			$\pm$ 100	nA
Zero Gate Voltage Drain Current	IDSS	VDS = 160 V, VGS = 0 V			1	$\mu$ A
		VDS = 160 V, VGS = 0 V, TJ = 55°C			25	
On-State Drain Current	ID(on)	VDS = 5 V, VGS = 10 V	34			A
Drain-Source On-Resistance	rDS(on)	VGS = 10 V, ID = 10 A			180	m $\Omega$
		VGS = 5.5 V, ID = 8 A			340	
Forward Transconductance	gfs	VDS = 15 V, ID = 10 A		25		S
Diode Forward Voltage	VSD	IS = 10 A, VGS = 0 V		0.86		V
Dynamic						
Total Gate Charge	Qg	VDS = 100 V, VGS = 4.5 V, ID = 10 A		7		nC
Gate-Source Charge	Qgs			3.1		
Gate-Drain Charge	Qgd			3.3		
Turn-On Delay Time	td(on)	VDS = 100 V, RL = 10 $\Omega$ , ID = 10 A, VGEN = 10 V, RGEN = 6 $\Omega$		9		ns
Rise Time	tr			14		
Turn-Off Delay Time	td(off)			33		
Fall Time	tf			26		
Input Capacitance	Ciss	VDS = 15 V, VGS = 0 V, f = 1 MHz		948		Pf
Output Capacitance	Coss			80		
Reverse Transfer Capacitance	Crss			54		

## Notes

- a. Pulse test: PW  $\leq$  300 $\mu$ s duty cycle  $\leq$  2%.
- b. Guaranteed by design, not subject to production testing.

• Characteristic Curves

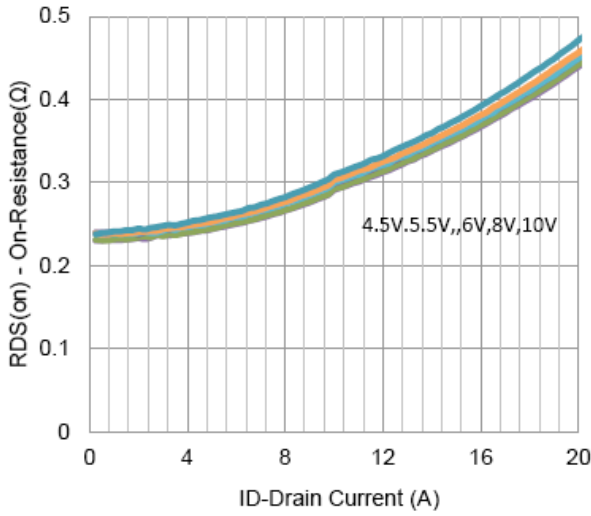


Figure 1. On Region Characteristics

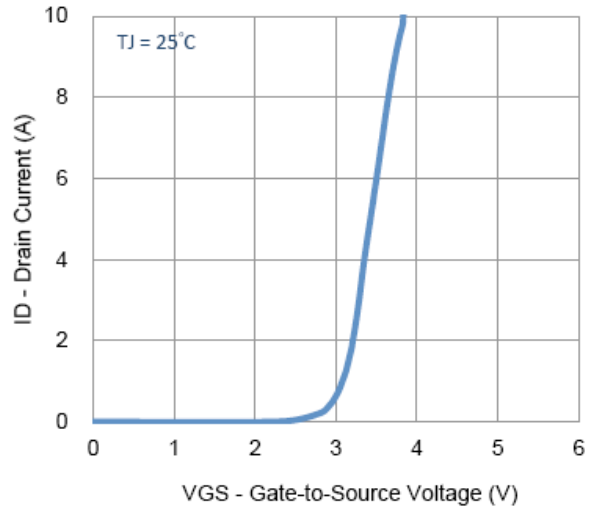


Figure 2. Transfer Characteristics

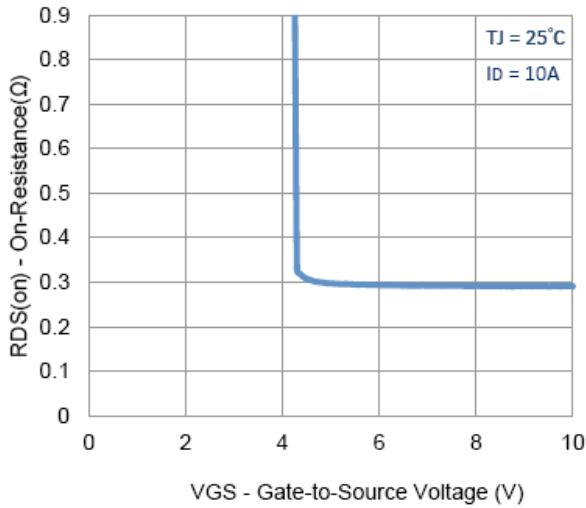


Figure 3. On-Resistance vs. Gate-to-Source Voltage

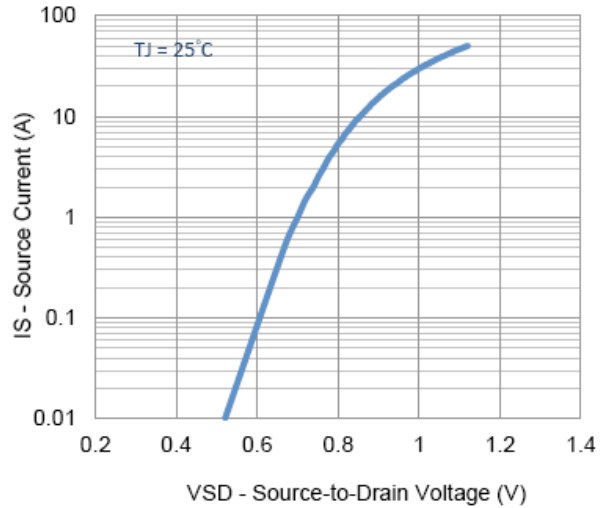


Figure 4. Drain-to-Source Forward Voltage

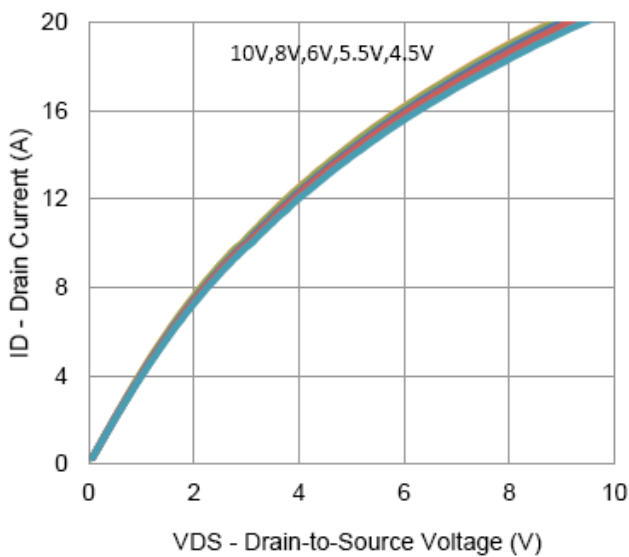


Figure 5. Output Characteristics

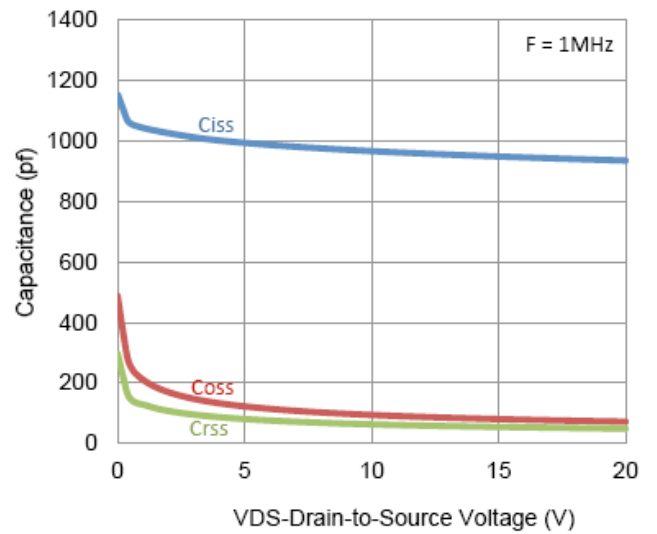


Figure 6. Capacitance Characteristics

• Characteristic Curves

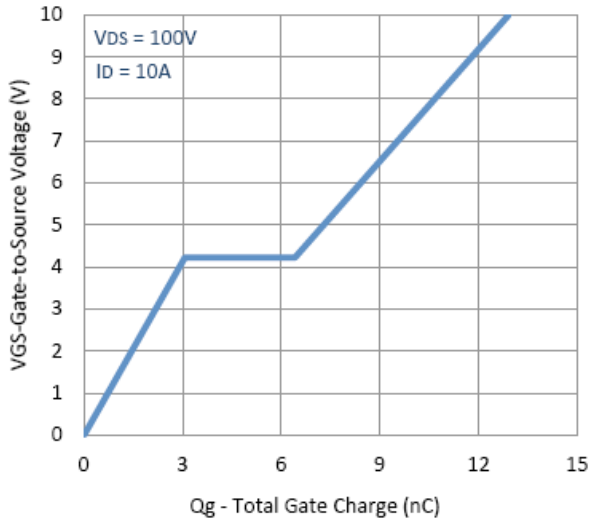


Figure 7. Gate Charge

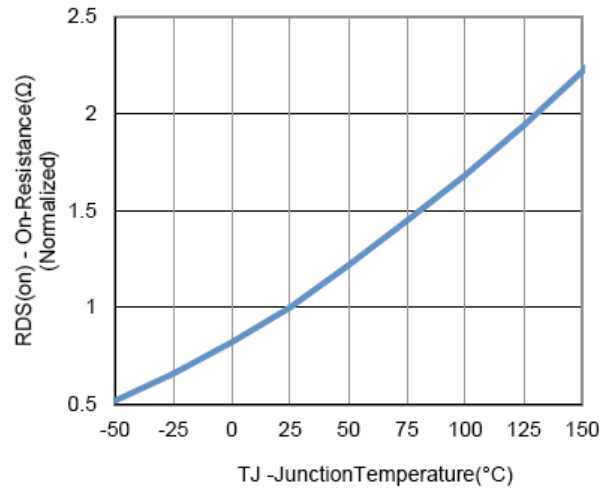


Figure 8. Normalized On-Resistance Vs Junction Temperature

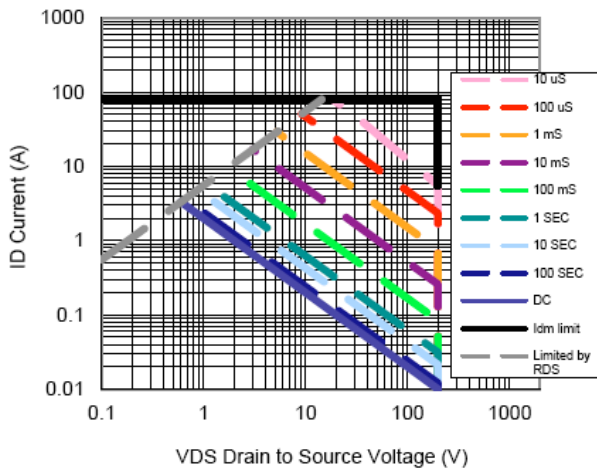


Figure 9. Maximum Safe Operating Area

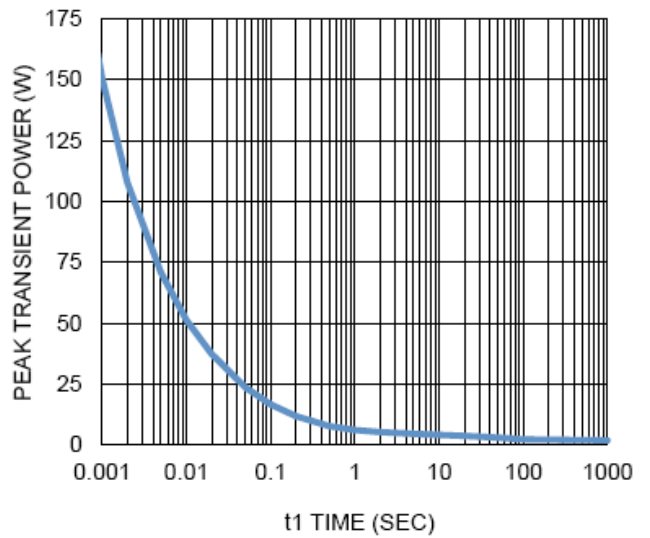


Figure 10. Single Pulse Maximum Power Dissipation

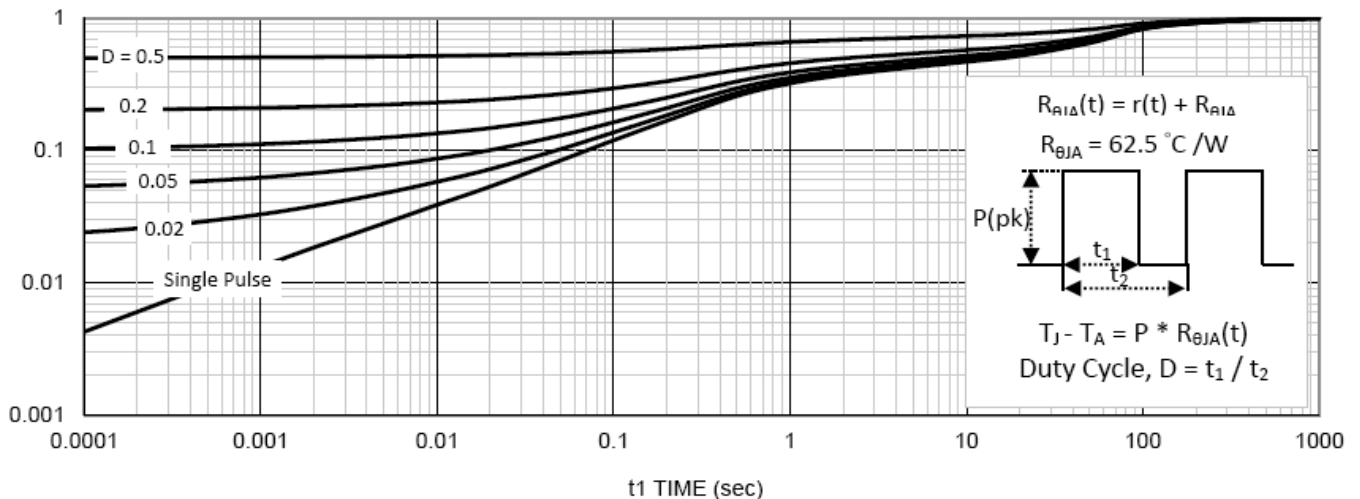
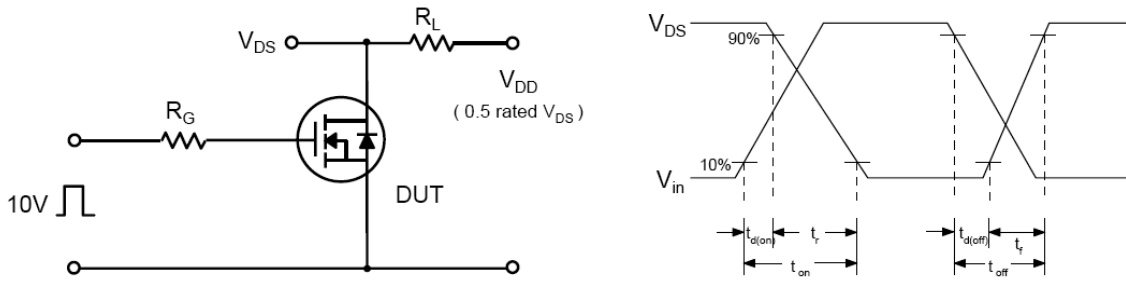
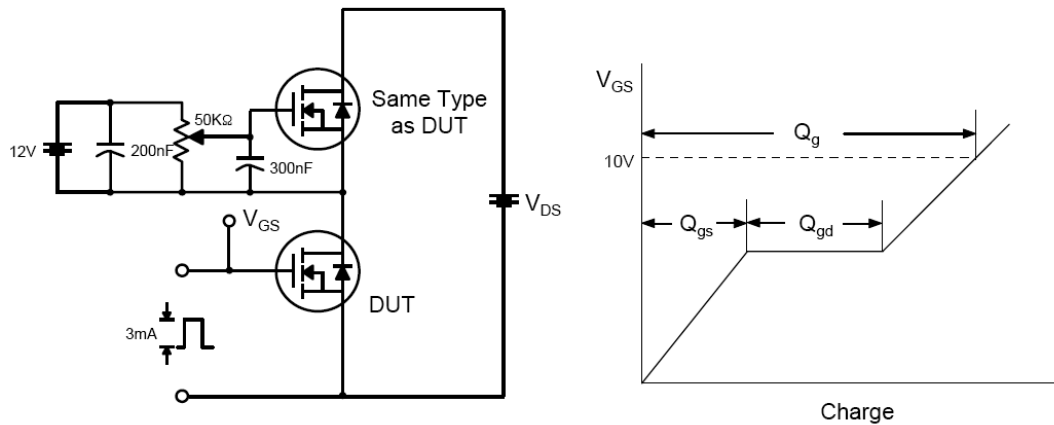


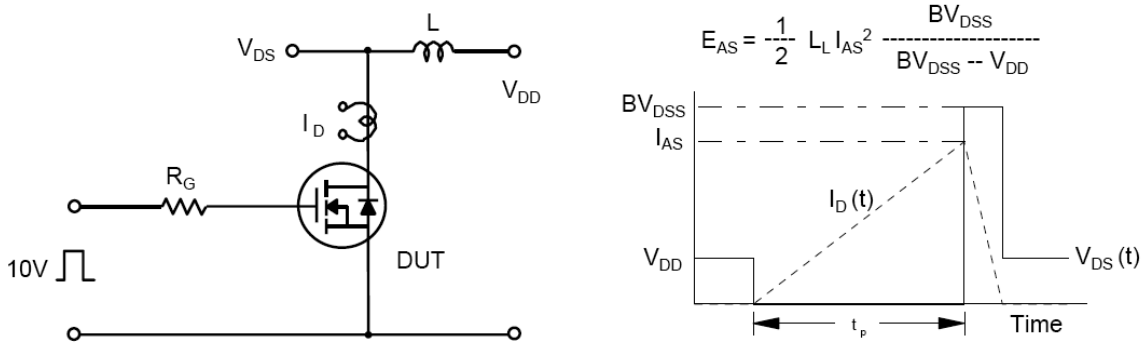
Figure 11. Transient Thermal Response Curve



**Fig 12. Resistive Switching Test Circuit & Waveforms**



**Fig 13. Gate Charge Test Circuit & Waveform**



**Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms**

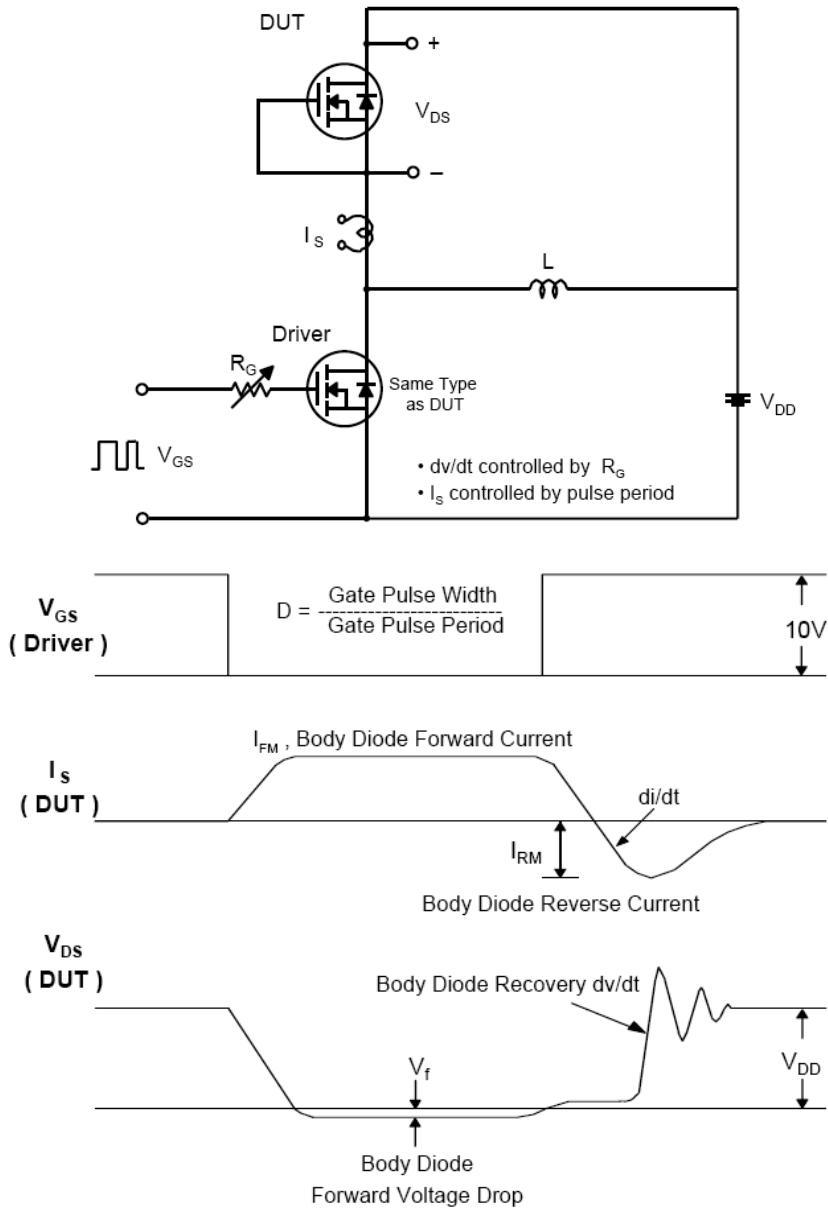
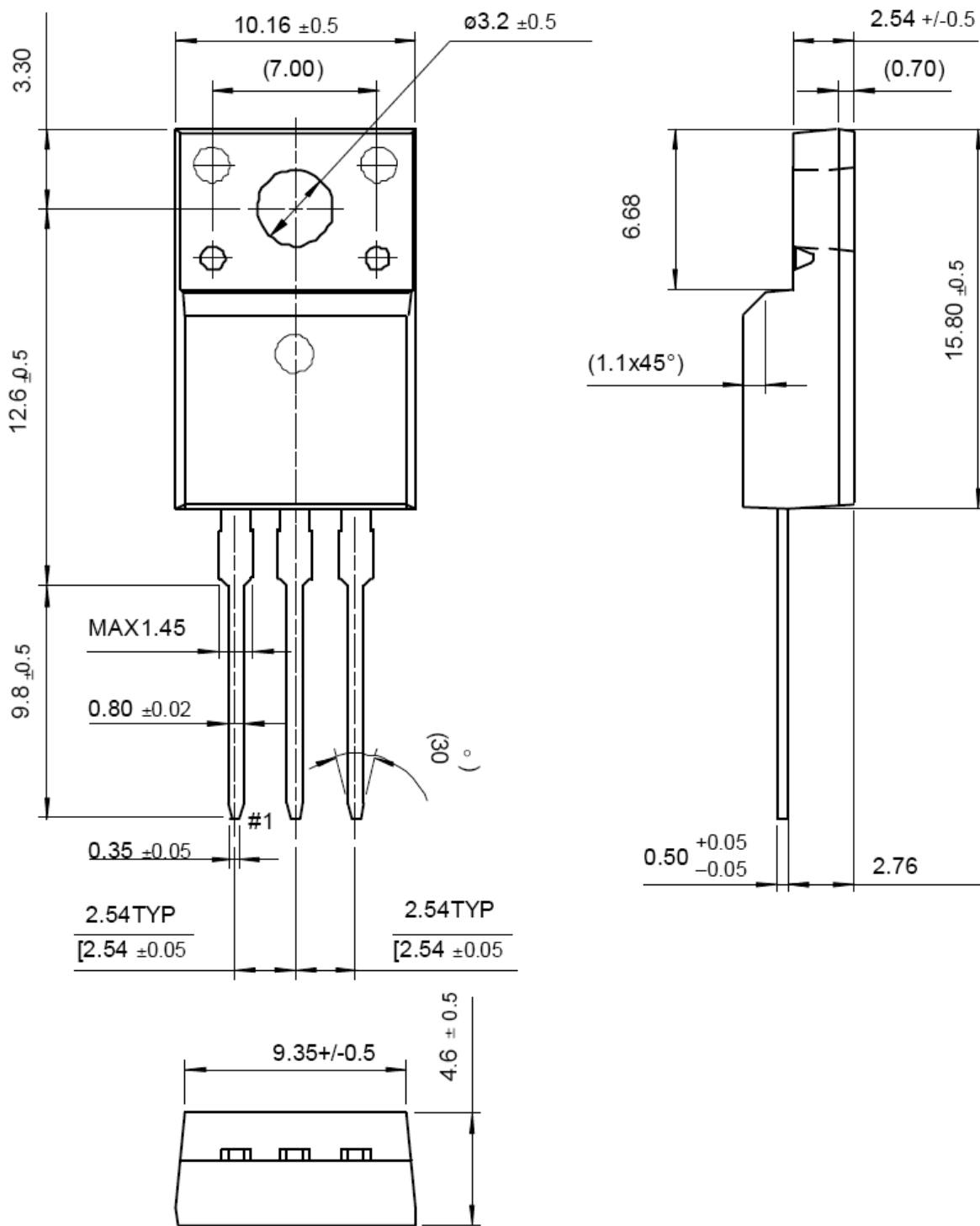


Fig 15. Peak Diode Recovery  $dv/dt$  Test Circuit & Waveforms

**Package Dimensions**

Dimensions in Millimeters





# MS40N20 200V N-Channel MOSFET

Legal Disclaimer Notice

## Disclaimer

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