N-Channel Enhancement Mode Power MOSFET

General Description

The YMP1404 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications.

Features

- V_{DS}=600V I_D= 7 A@ V_{GS}=10V;
  $R_{DS(ON)}$< 1.2 Ω @ V_{GS} =10V
- Special process technology for high ESD capability
- Special designed for Convertors and power controls
- High density cell design for ultra low Rdson
- Fully characterized Avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

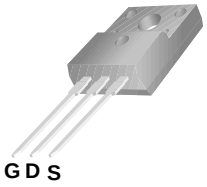
Application

- Power switching application
- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply

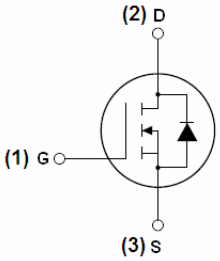
Product Summary

BV_{DSS}	typ.	600	V
$R_{DS(ON)}$	typ.	1	Ω
	max.	1.2	Ω
I_D		7	A

100% UIS TESTED!



TO-220F **top view**



Schematic diagram

Package Marking And Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
YMP7N60	YMP7N60	TO-220F	-	-	-

Absolute Maximum Ratings

T_C = 25°C unless otherwise noted

Symbol	Parameter		YMP7N60	YMP7N60	Units
V_{DSS}	Drain-Source Voltage		600		V
I_D	Drain Current - Continuous (T_C = 25°C)		7.0	7.0 *	A
	- Continuous (T_C = 100°C)		4.4	4.4 *	A
I_{DM}	Drain Current - Pulsed	(Note 1)	28	28 *	A
V_{GSS}	Gate-Source Voltage		± 30		V
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	420		mJ
I_{AR}	Avalanche Current	(Note 1)	7.0		A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	14.7		mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	5.5		V/ns
P_D	Power Dissipation (T_C = 25°C)		147	48	W
	- Derate above 25°C		1.18	0.38	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150		°C
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		300		°C

* Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	YMP7N60	YMP7N60	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case Max.	0.85	2.6	°C/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink Typ.	0.5	--	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient Max.	62.5	62.5	°C/W

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	600	--	--	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	--	0.65	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 600 V, V_{GS} = 0 V	--	--	10	μA
		V_{DS} = 480 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 = 3.5 A	--	1.0	1.2	Ω
g_{FS}	Forward Transconductance	V_{DS} = 40 V, I_D = 3.5 A (Note 4)	--	8.2	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	1380	1800	pF
C_{oss}	Output Capacitance		--	115	150	pF
C_{rss}	Reverse Transfer Capacitance		--	23	30	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 300 V, I_D = 7.0 A, R_G = 25 Ω (Note 4, 5)	--	30	70	ns
t_r	Turn-On Rise Time		--	80	170	ns
$t_{d(off)}$	Turn-Off Delay Time		--	125	260	ns
t_f	Turn-Off Fall Time		--	85	180	ns
Q_g	Total Gate Charge	V_{DS} = 480 V, I_D = 7.0 A, V_{GS} = 10 V (Note 4, 5)	--	38	50	nC
Q_{gs}	Gate-Source Charge		--	6.4	--	nC
Q_{gd}	Gate-Drain Charge		--	15	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	7.0	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	28	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 7.0 A	--	--	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 7.0 A, dI_F / dt = 100 A/μs (Note 4)	--	415	--	ns
Q_{rr}	Reverse Recovery Charge		--	4.6	--	μC

Typical Characteristics

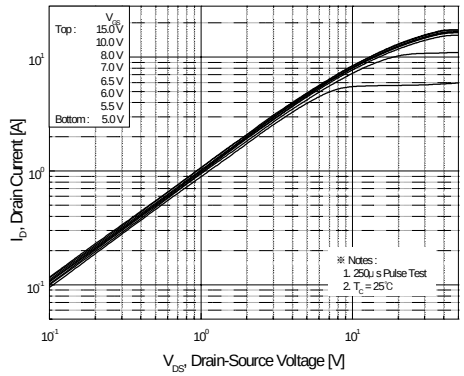


Figure 1. On-Region Characteristics

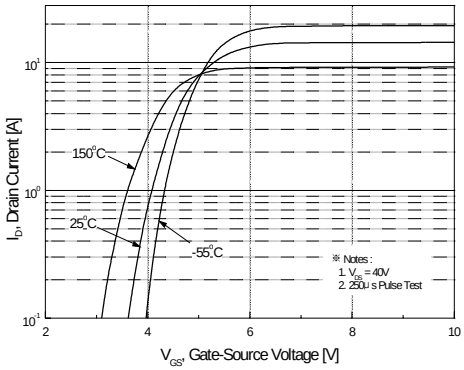


Figure 2. Transfer Characteristics

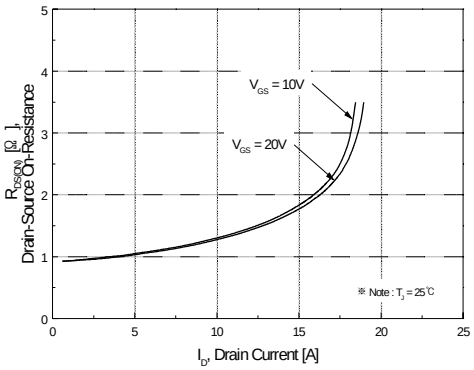


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

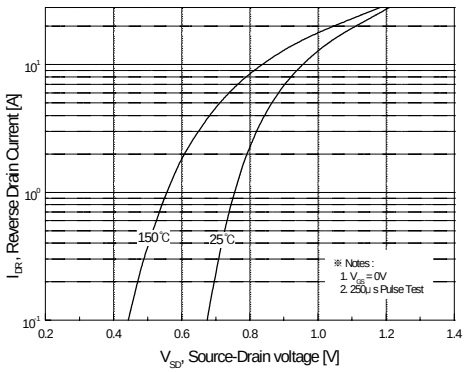


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

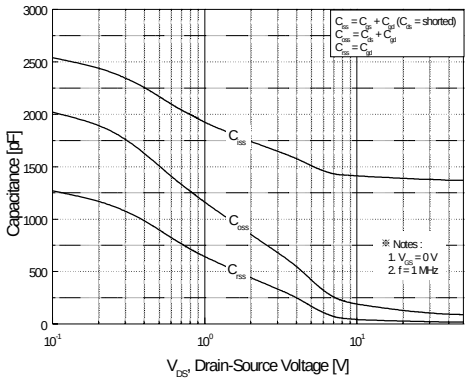


Figure 5. Capacitance Characteristics

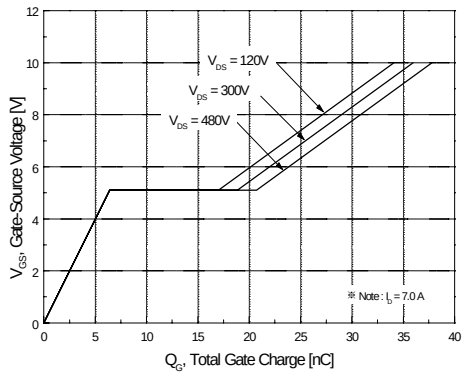


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

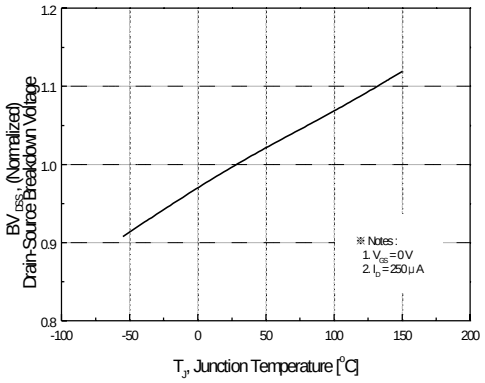


Figure 7. Breakdown Voltage Variation vs Temperature

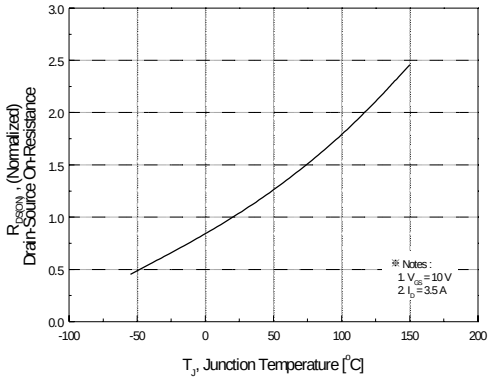


Figure 8. On-Resistance Variation

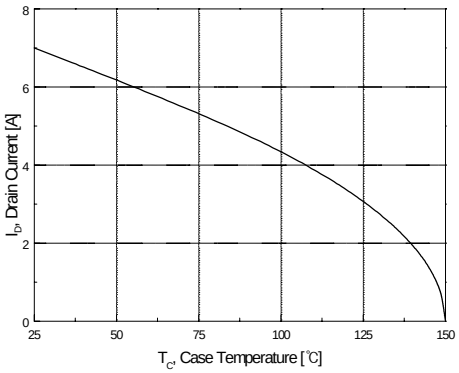


Figure 10. Maximum Drain Current vs Case Temperature

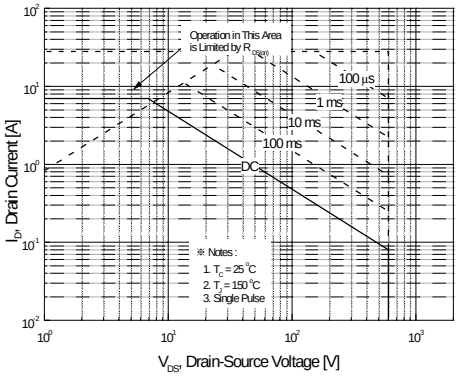


Figure 9-2. Maximum Safe Operating Area

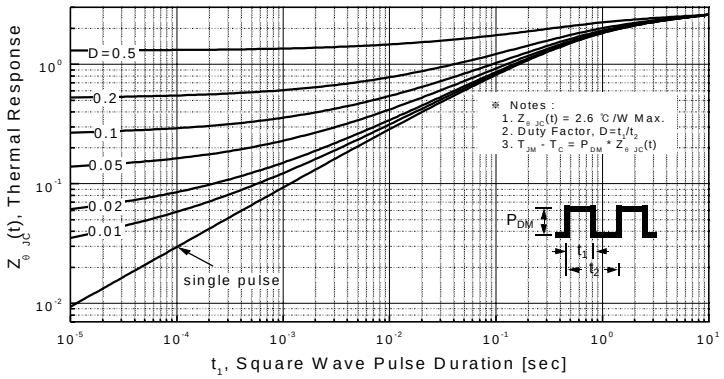
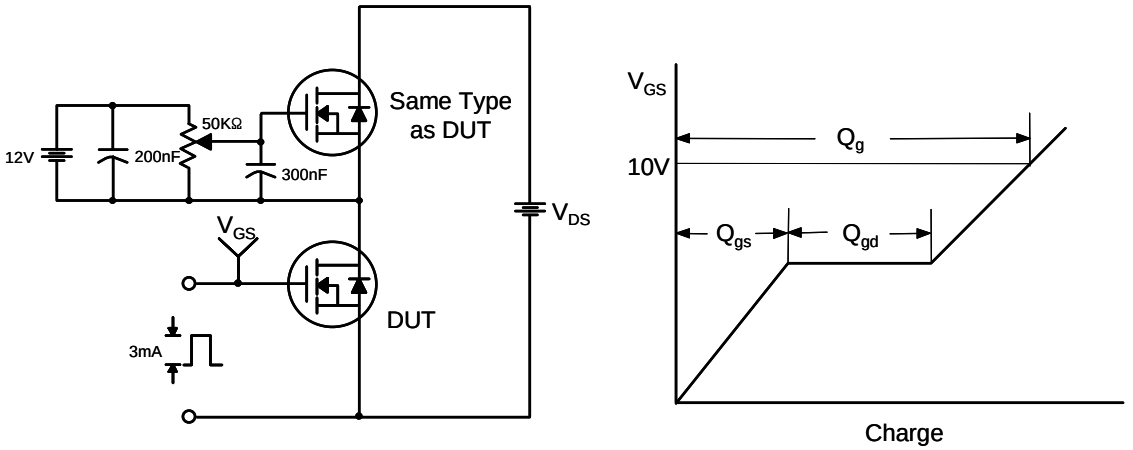
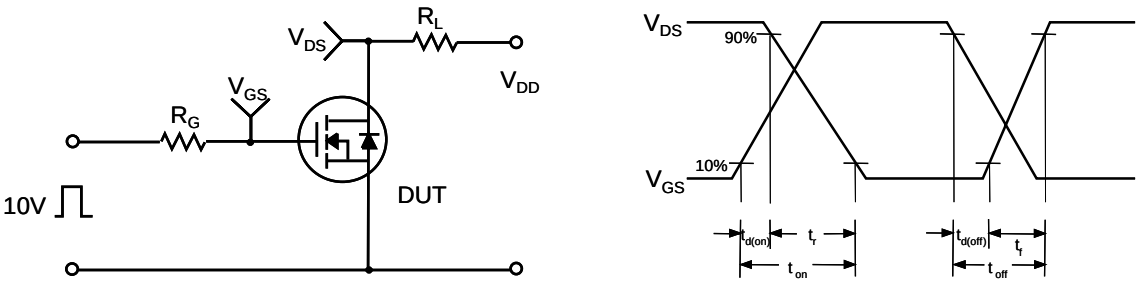


Figure 11-2. Transient Thermal Response Curve for YMP7N60

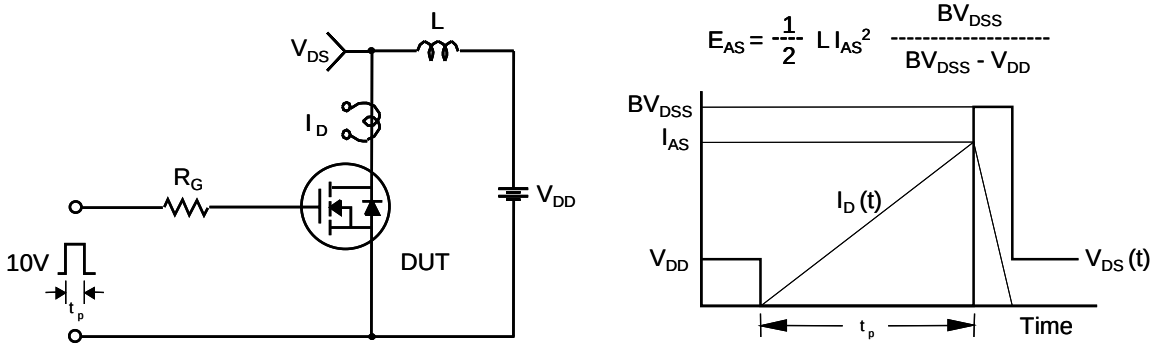
Gate Charge Test Circuit & Waveform



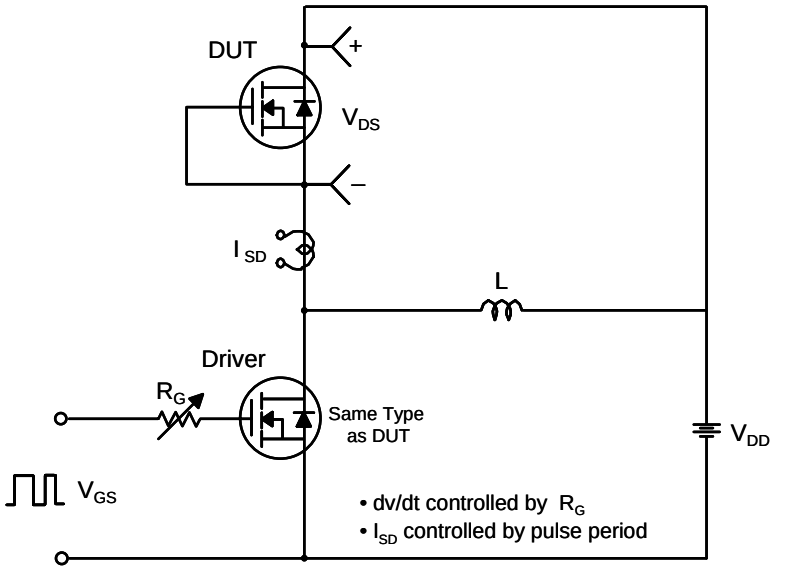
Resistive Switching Test Circuit & Waveforms

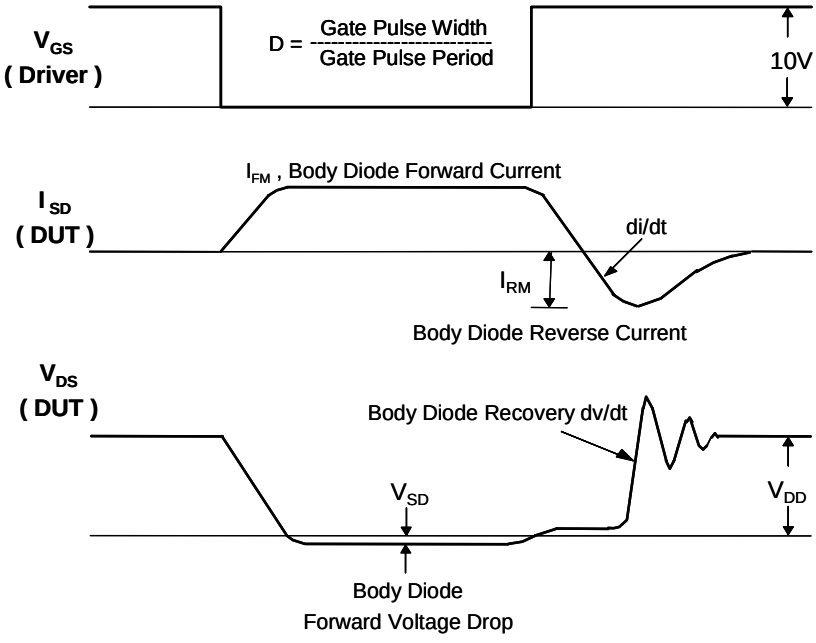


Unclamped Inductive Switching Test Circuit & Waveforms

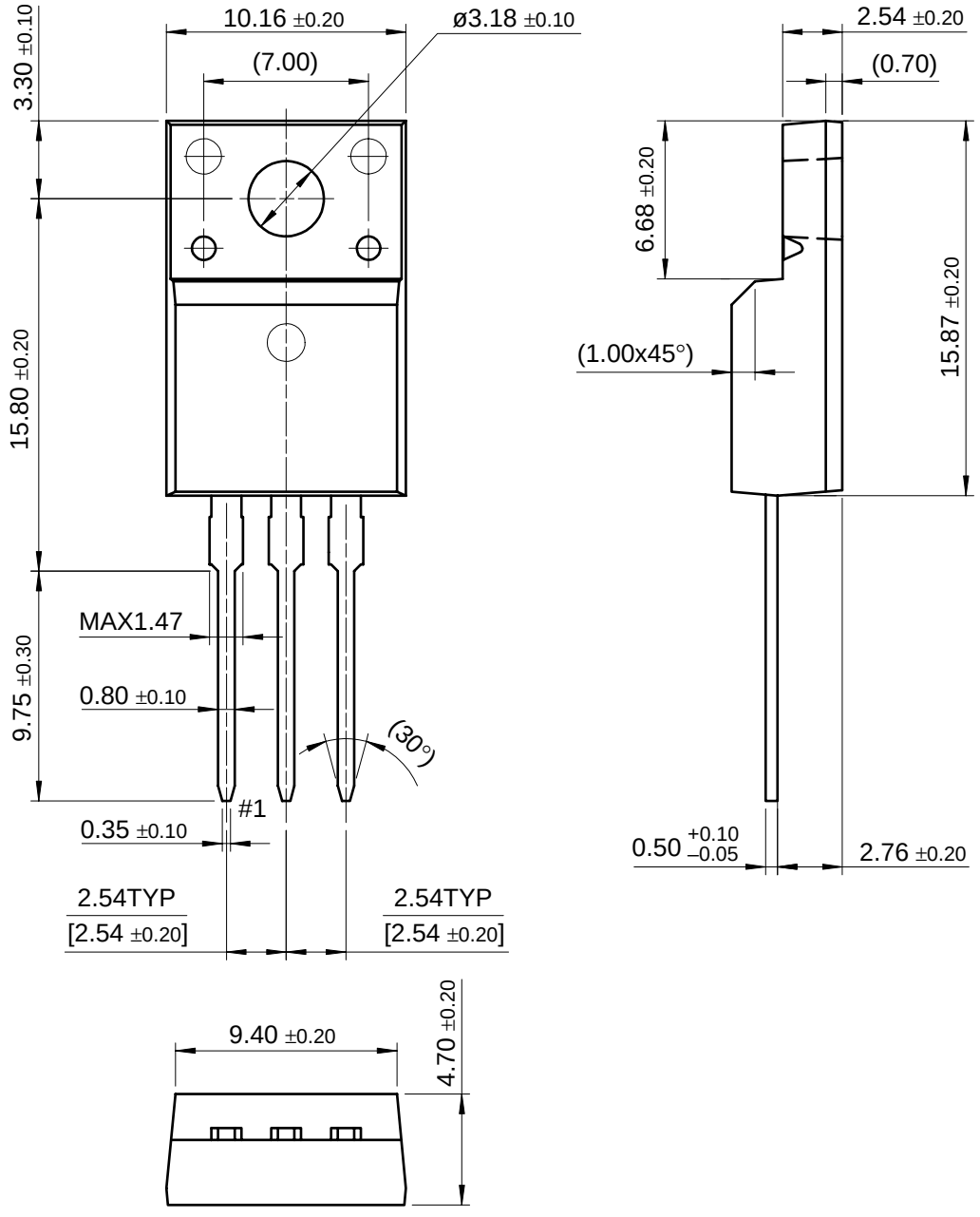


Peak Diode Recovery dv/dt Test Circuit & Waveforms





TO-220F


10.16 ±0.20
ø3.18 ±0.10
(7.00)
3.30 ±0.10
15.80 ±0.20
9.75 ±0.30
MAX1.47
0.80 ±0.10
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0.35 ±0.10
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2.54TYP
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2.76 ±0.20
9.40 ±0.20
4.70 ±0.20