

500V N-channel MOSFET

General Description

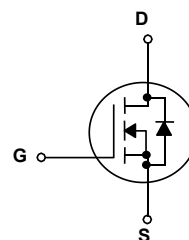
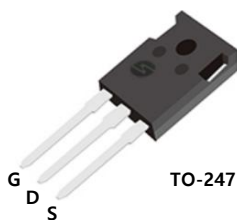
This Power MOSFET is produced using WPMtek's advanced planar stripe DMOS technology.

This advanced technology has been especially tailored to minimize conduction loss, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

These devices are well suited for AC/DC power conversion in switching mode operation for higher efficiency.

Features

- 30A, 500V, $R_{DS(on)typ} = 150m\Omega @ V_{GS} = 10V$
- Low gate charge (typical 72nC)
- Low C_{rss} (typical 13pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



Absolute Maximum Ratings

$T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	WTM30N50VMP	Units
V_{DSS}	Drain-Source Voltage	500	V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$)	30	A
	- Continuous ($T_C = 100^\circ\text{C}$)	20	A
I_{DM}	Drain Current - Pulsed (Note 1)	120	A
V_{GSS}	Gate-Source Voltage	± 30	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	430	mJ
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$)	278	W
	- Derate above 25°C	2.2	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	$^\circ\text{C}$

* Drain current limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	WTM30N50VMP	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.45	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	$^\circ\text{C}/\text{W}$

Electrical Characteristics

$T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	500	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 500\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	μA
		$V_{DS} = 400\text{ V}, T_C = 125^\circ\text{C}$	--	--	10	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 15\text{ A}$	--	150	180	m Ω

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 500\text{ kHz}$	--	4110	--	pF
C_{oss}	Output Capacitance		--	415	--	pF
C_{rss}	Reverse Transfer Capacitance		--	13	--	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 250\text{ V}, I_D = 20\text{ A},$ $R_G = 25\text{ }\Omega$ (Note 3)	--	29	--	ns
t_r	Turn-On Rise Time		--	40	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	105	--	ns
t_f	Turn-Off Fall Time		--	41	--	ns
Q_g	Total Gate Charge	$V_{DS} = 250\text{ V}, I_D = 30\text{ A},$ $V_{GS} = 10\text{ V}$ (Note 3)	--	72	--	nC
Q_{gs}	Gate-Source Charge		--	20	--	nC
Q_{gd}	Gate-Drain Charge		--	26	--	nC
R_G	Gate Resistance	$f = 1\text{ MHz}$	--	1.9	--	Ω

Drain-Source Diode Characteristics and Maximum Ratings

I_S	Maximum Continuous Drain-Source Diode Forward Current	--		30	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current	--		120	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 20\text{ A}$	--		1.4 V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 20\text{ A},$	--	400	ns
Q_{rr}	Reverse Recovery Charge	$di_F / dt = 100\text{ A}/\mu\text{s}$	--	7.5	μC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: $T_J = 25^\circ\text{C}, V_{DD} = 50\text{ V}, V_G = 10\text{ V}, L = 0.5\text{ mH},$
3. Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 0.5\%$

Typical Characteristics

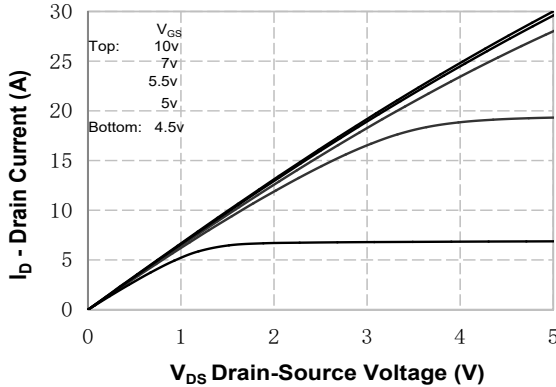


Figure 1. On-Region Characteristics

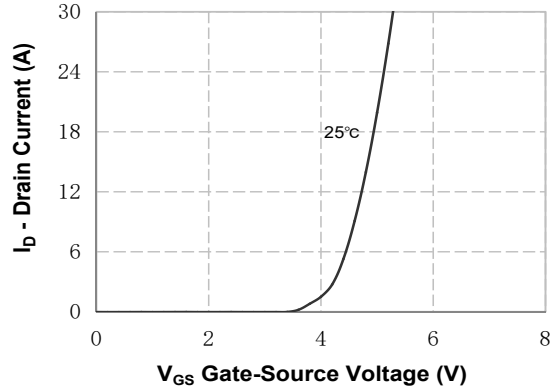


Figure 2. Transfer Characteristics

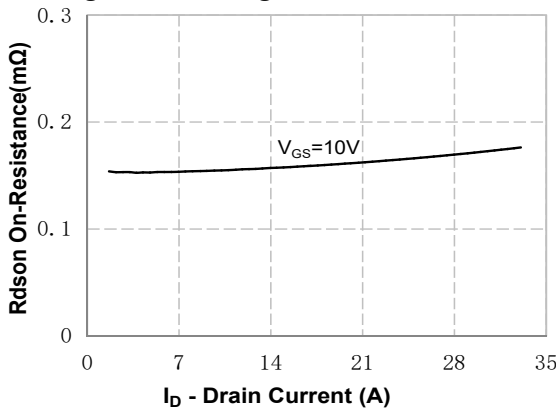


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

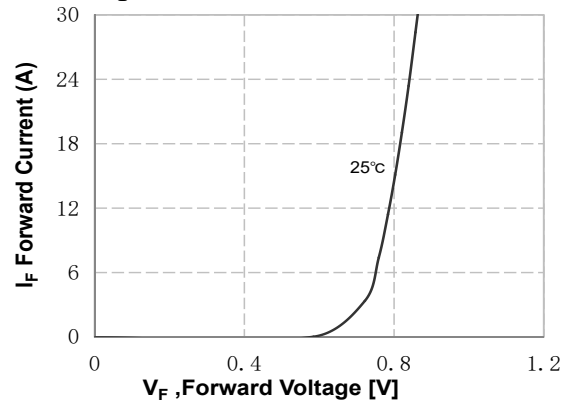


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

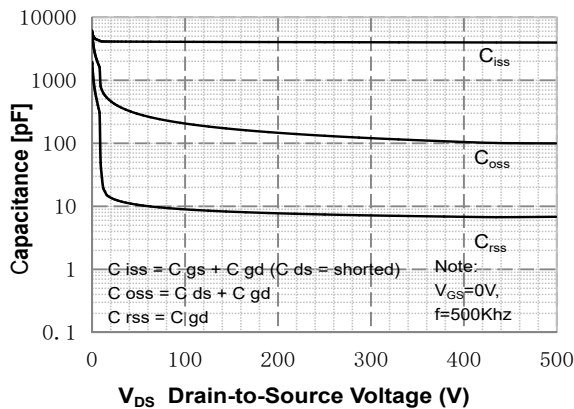


Figure 5. Capacitance Characteristics

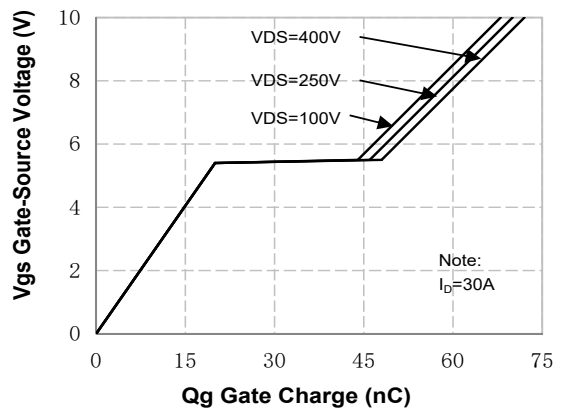


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

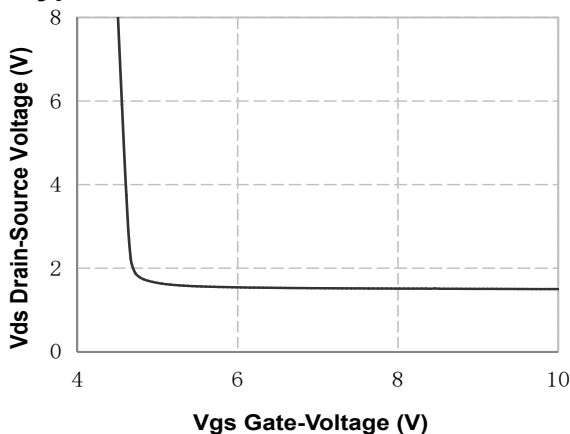


Figure 7. Vds Drain-Source Voltage vs Gate Voltage

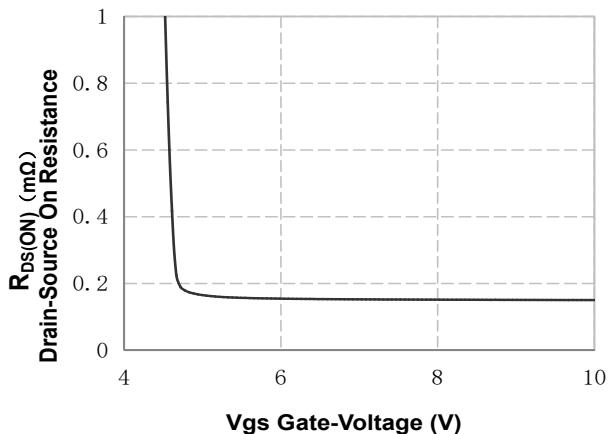


Figure 8. On-Resistance vs Gate Voltage

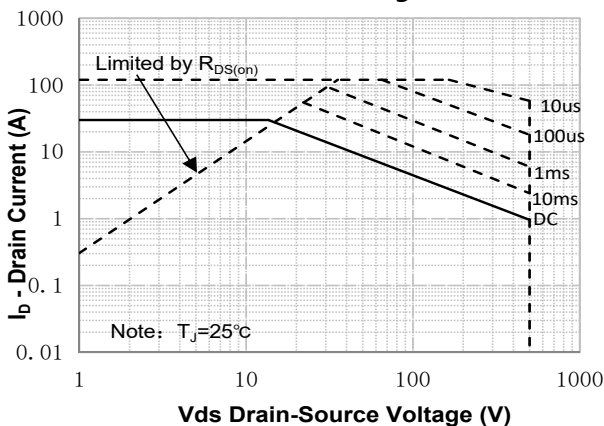


Figure 9. Maximum Safe Operating Area

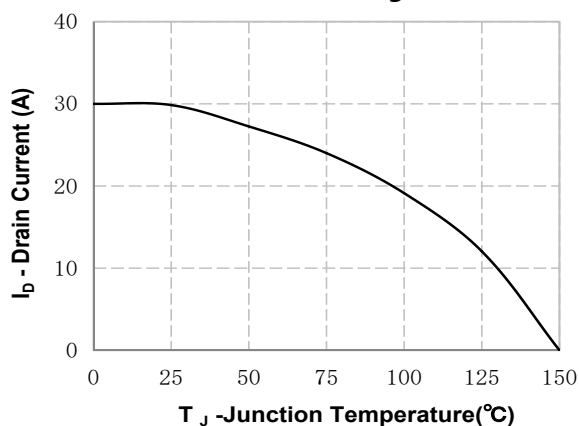


Figure 10. Maximum Drain Current vs Temperature

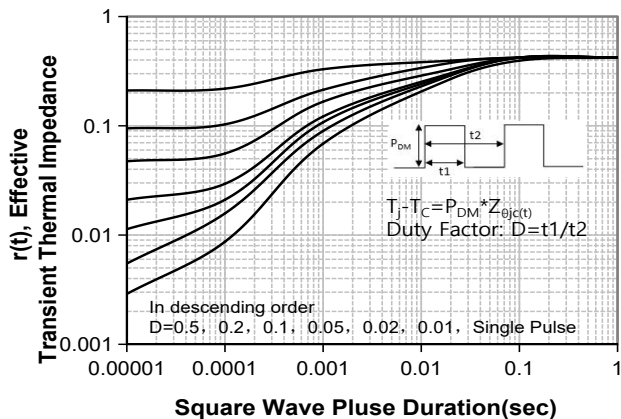
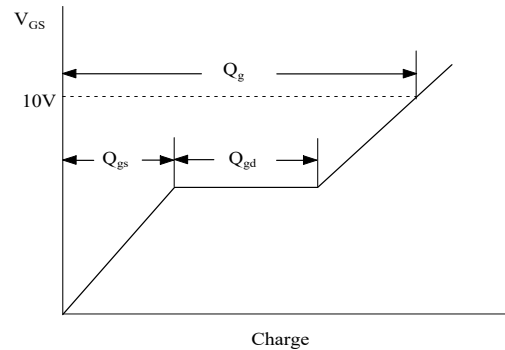
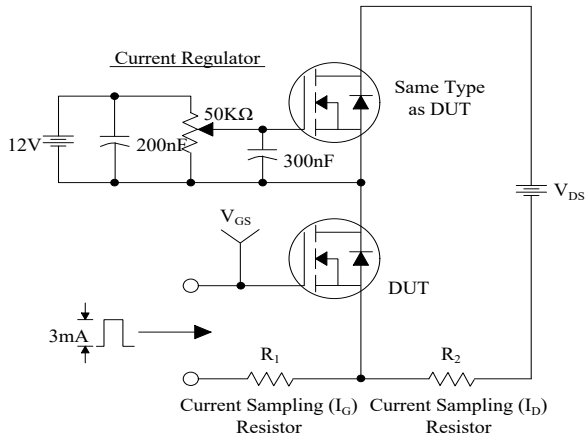
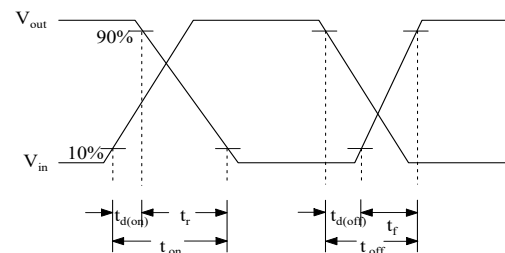
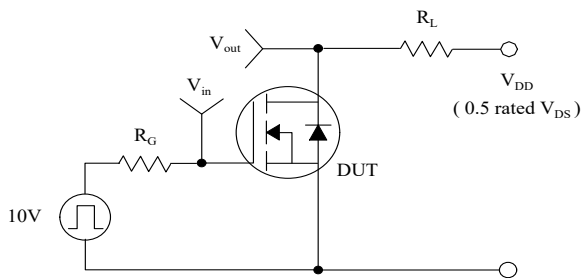


Figure 11. Transient Thermal Response Curve

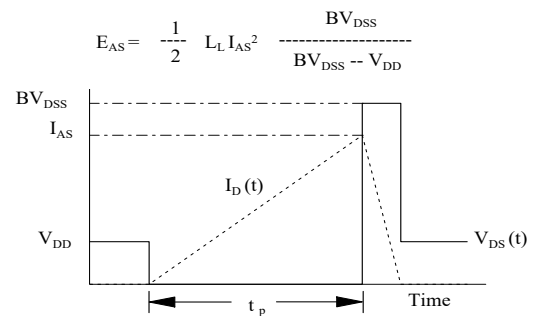
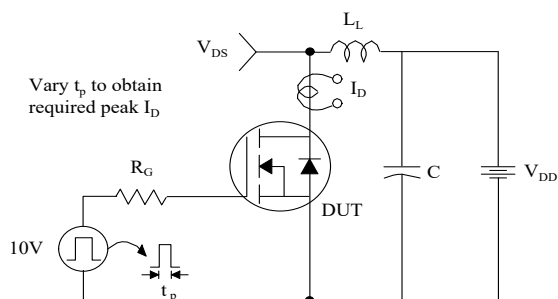
Gate Charge Test Circuit & Waveform



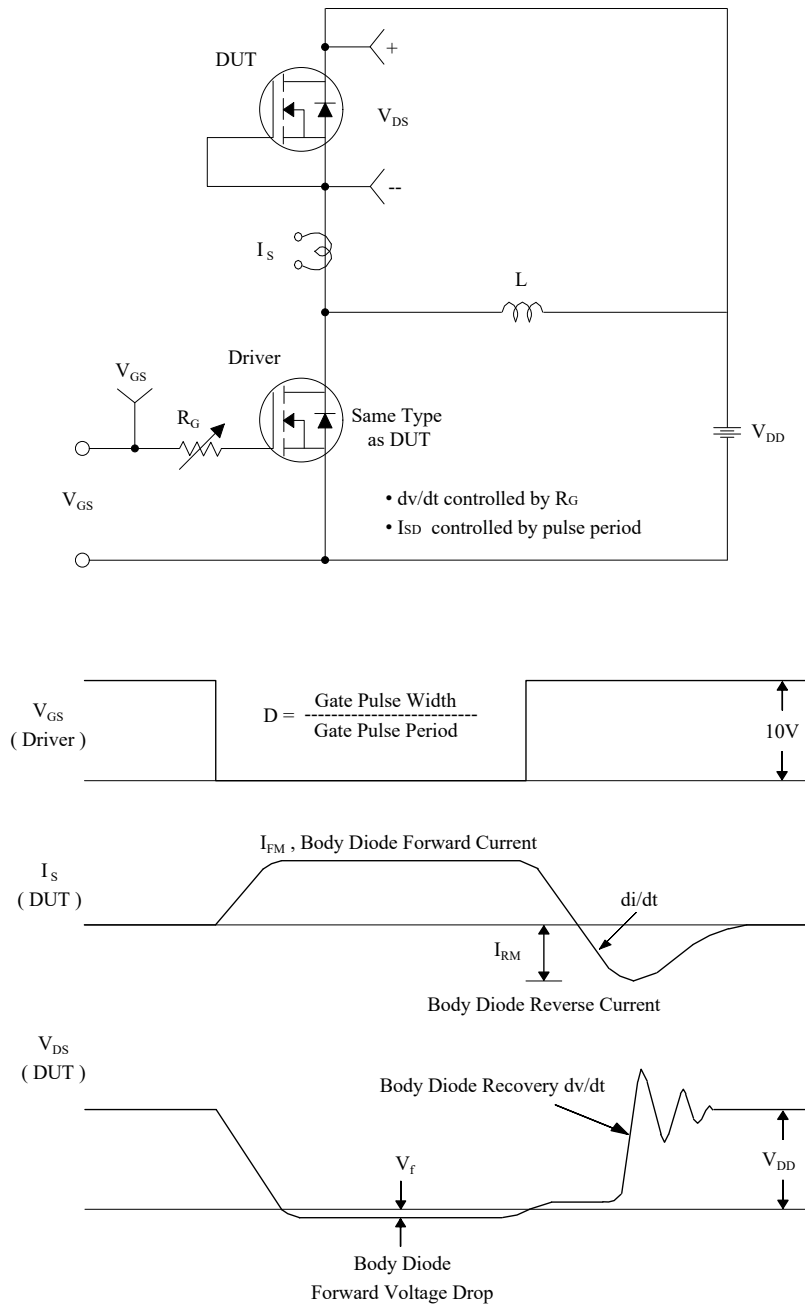
Resistive Switching Test Circuit & Waveforms



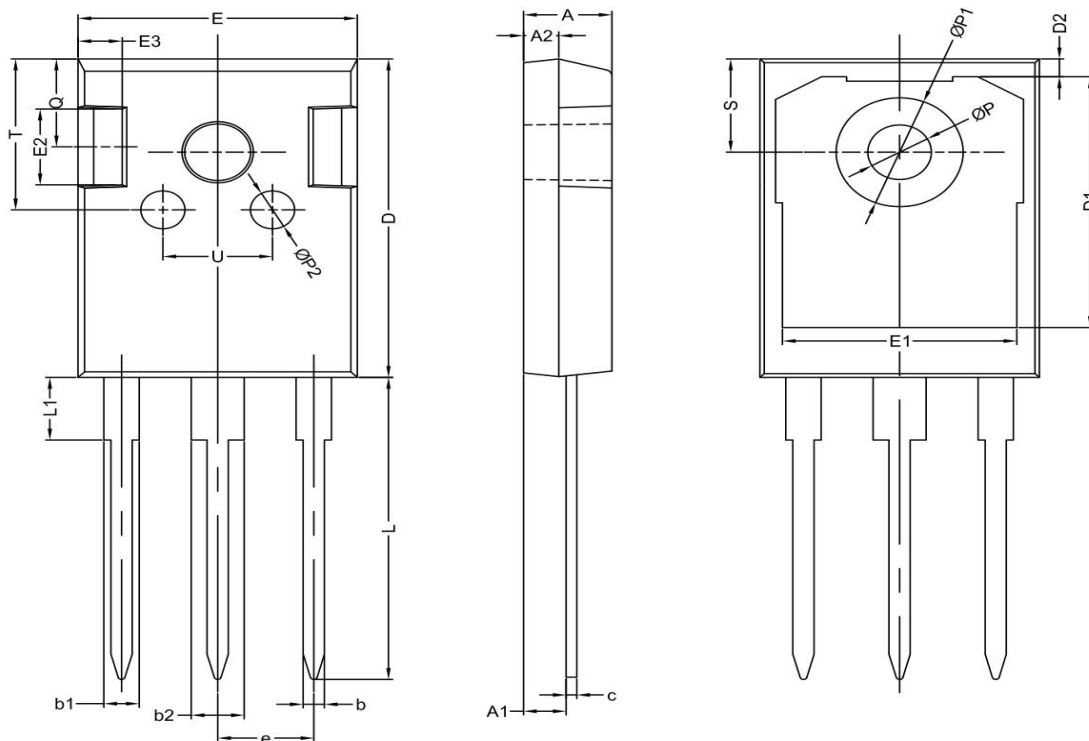
Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms



TO-247 OUTLINE



SYMBOL	Mechanical Dimensions/mm			SYMBOL	Mechanical Dimensions/mm			SYMBOL	Mechanical Dimensions/mm		
	MIN	NOM	MAX						MIN	NOM	MAX
A	4.80	5.00	5.20	D	20.80	21.00	21.20	L1	-	4.13	-
A1	2.21	2.41	2.61	D1	-	16.55	-	Ø P	3.5	3.6	3.7
A2	1.90	2.00	2.10	E	15.60	15.80	16.0	Ø P1	-	-	7.40
b	1.10	1.20	1.35	E1		13.3		Ø P2	-	2.50	-
b1	-	2.00	-	E2		5.0		Q	-	5.8	-
b2	-	3.00	-	e		5.44		S	6.05	6.15	6.25
c	0.55	0.60	0.75	L	19.42	19.92	20.42	T	-	10.0	-

NOTE:

1The plastic package is not marked as smooth surfaceRa=0.1;Subglossy surfaceR

a=0.8

2.Undeclared tolerance±0.15,Unmarked filletRmax=0.25

NAME	TO-247 OUTLINE	UNIT	mm	DESIGNED	Shawn	
DWGNO		PAGE	1 OF 1	CHECKED		
VERSION	Ver1.0	ISSUE DATE		APPROVED		

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