



## General Description

The UV120N03L 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

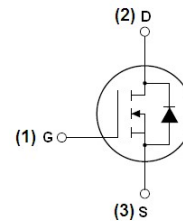
Enhancement Mode

Very low on-resistance  $R_{DS(on)}$  @  $V_{GS}=4.5V$

100% Avalanche Tested



TO-252-2L Top view



Schematic diagram

$V_{DS}$	30	V
$R_{DS(on) TYP@V_{GS}=10V}$	2.1	m $\Omega$
$R_{DS(on) TYP@V_{GS}=4.5V}$	3.2	m $\Omega$
$I_D$	120	A

## Applications

Power switching application

Hard Switched and High Frequency Circuits

Uninterruptible Power Supply

## Package Marking And Ordering Information

Part ID	Package Type	Marking	Tape and Reel information
UV120N03L	TO-252-2L	UV120N03L	2500pcs/REEL

## Maximum ratings, at $T_j=25^\circ C$ , unless otherwise specified

Symbol	Parameter	Rating	Unit
$V_{(BR)DSS}$	Drain –Source breakdown voltage	30	V
$I_S$	Diode continuous forward current	$T_c=25^\circ C$ 120	A
$I_D$	Continuous drain current @ $V_{gs}=10V$	$T_c=25^\circ C$ 120	A
$I_{DM}$	Pulse drain current tested①	$T_c=25^\circ C$ 250	A
$E_{AS}$	Avalanche energy, single pulsed②	85	mJ
$P_D$	Maximum power dissipation	$T_c=25^\circ C$ 3.5	W
$V_{GS}$	Gate-Source voltage	$\pm 20$	V
$T_{STG} T_J$	Storage and operating temperature range	-55 to 175	$^\circ C$



## Thermal Characteristic

Symbol	Parameter	Typical	Unit
$R_{QJC}$	Thermal Resistance-Junction to Case	1.3	$^{\circ}\text{C}/\text{W}$
$R_{QJA}$	Thermal Resistance-Junction to Ambient	62.5	$^{\circ}\text{C}/\text{W}$

## Typical Characteristics

Symbol	Parameter	Condition	Min	Type	Max	Unit
<b>Static Electrical Characteristics @T<sub>j</sub>=25<math>^{\circ}\text{C}</math> ( unless otherwise stated )</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$	30			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=24\text{V}, V_{GS}=0\text{V}$			1	$\mu\text{A}$
$I_{GSS}$	Gate-Body Leakage Current	$V_{GS}=\pm 20\text{V}, V_{DS}=0\text{V}$			$\pm 100$	nA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	1.2		2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance <sup>③</sup>	$V_{GS}=10\text{V}, I_D=20\text{A}$		2.1	2.5	$\text{m}\Omega$
$R_{DS(ON)}$	Drain-Source On-State Resistance <sup>③</sup>	$V_{GS}=4.5\text{V}, I_D=10\text{A}$		3.2	3.7	$\text{m}\Omega$
<b>Dynamic Electrical Characteristics @T<sub>j</sub>=25<math>^{\circ}\text{C}</math> ( unless otherwise stated )</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=20\text{V},$		5000		PF
$C_{oss}$	Output Capacitance	$V_{GS}=0\text{V},$		650		PF
$C_{rss}$	Reverse Transfer Capacitance	$F=1\text{MHz}$		500		PF
$Q_g$	Total Gate Charge	$V_{DS}=24\text{V},$		104		nC
$Q_{gs}$	Gate-Source Charge	$I_D=30\text{A},$		14		nC
$Q_{gd}$	Gate-Drain Charge	$V_{GS}=10\text{V}$		31		nC
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-on Delay time	$V_{DD}=24\text{V}$		20		nS
$t_r$	Turn-on Rise time	$I_D=8\text{A}$		8		nS
$t_{d(off)}$	Turn-off Delay time	$R_G=3\Omega$		109		nS
$t_f$	Turn-off Fall time	$V_{GS}=10\text{V}$		30		nS
<b>Source-Drain Diode Characteristics</b>						
$V_{SD}$	Forward on voltage	$I_{SD}=40\text{A}, V_{GS}=0\text{V}$			1.2	V
$t_{rr}$	Reverse Recovery Time	$T_j=25^{\circ}\text{C}, I_{SD}=8\text{A}$		15		nS
$Q_{rr}$	Reverse Recovery Charge	$V_{GS}=0\text{V}, di/dt=200\text{A}/\mu\text{s}$		34		nC

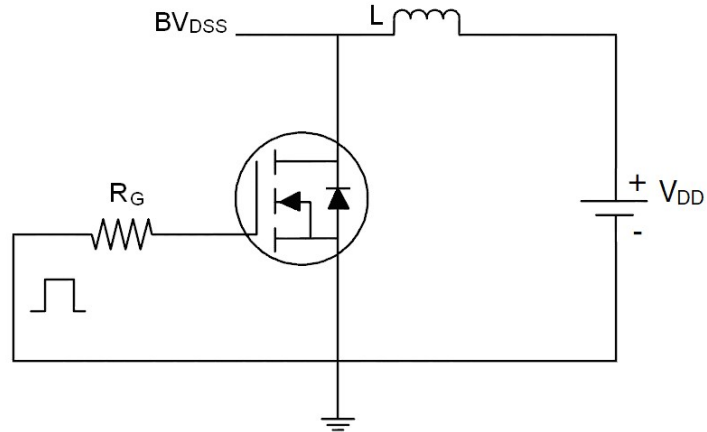
Note:

- ① Repetitive rating; pulse width limited by max, junction temperature.
- ② Limited by  $T_{jmax}$ , starting  $T_j=25^{\circ}\text{C}$ ,  $L=0.1\text{mH}$ ,  $R_G=25\Omega$ ,  $I_{AS}=40\text{A}$ ,  $V_{GS}=10\text{V}$ , Part not recommended for use above this value
- ③ Pulse width  $\cong 300\mu\text{s}$ ; duty cycle  $\cong 2\%$

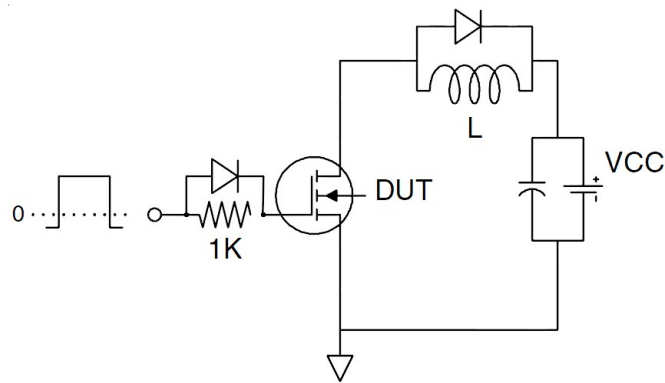


## Test circuit

### (1) $E_{AS}$ test circuits



### (2) Gate charge test circuit



### (3) Switch time test circuit

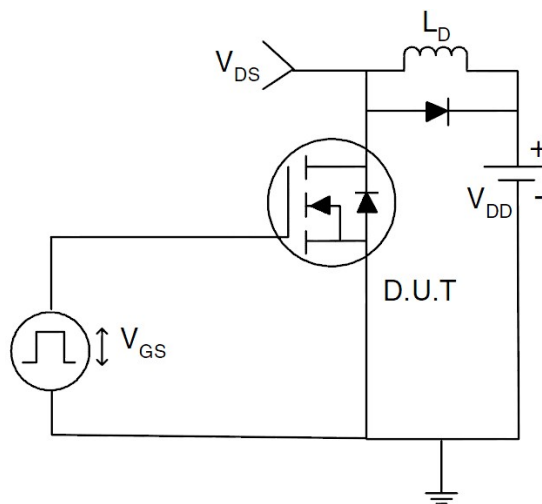




Fig.1 Power Dissipation

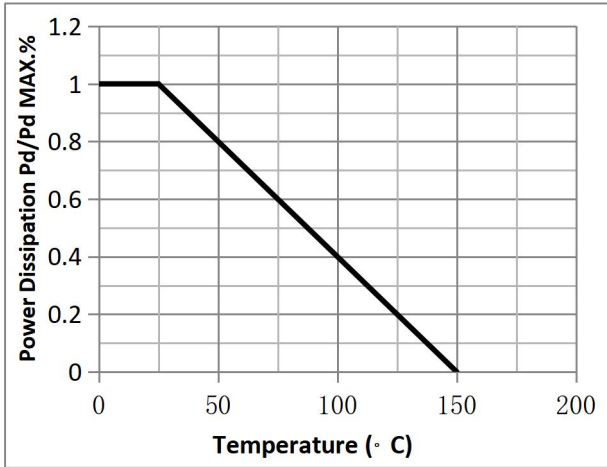


Fig.2 Typical output Characteristics

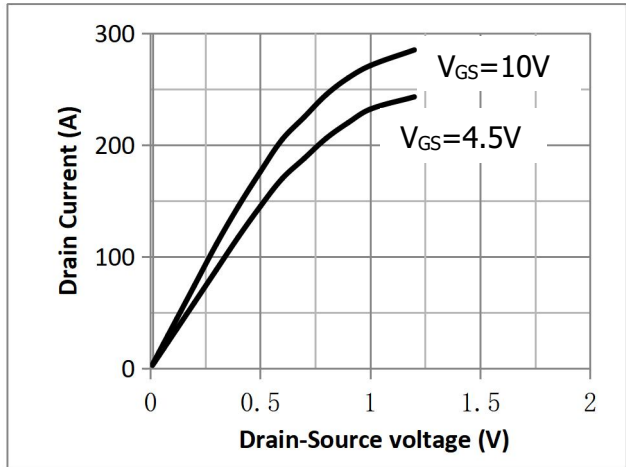


Fig.3 Threshold Voltage V.S Junction Temperature

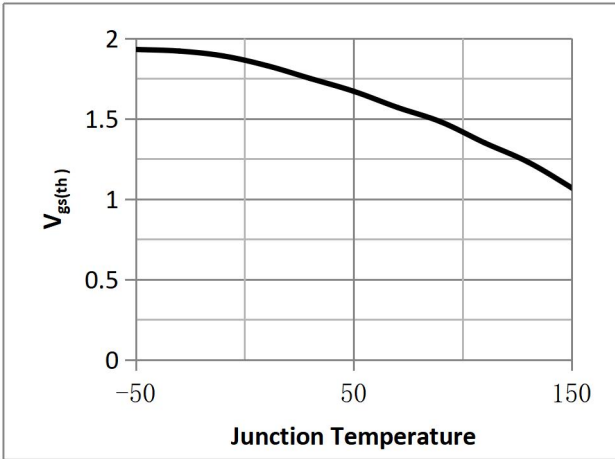


Fig.4 Resistance V.S Drain Current

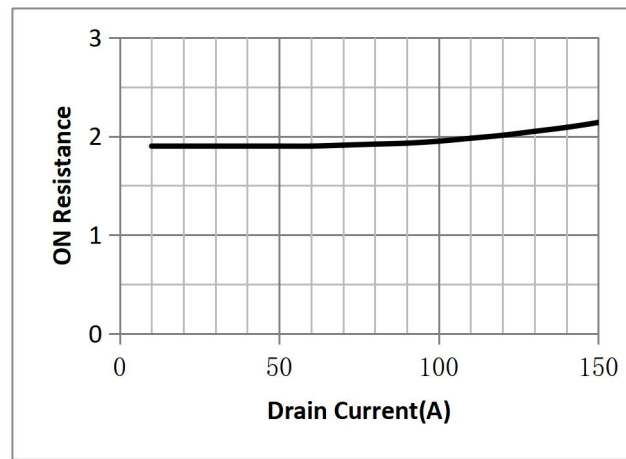


Fig.5 On-Resistance VS Gate Source Voltage

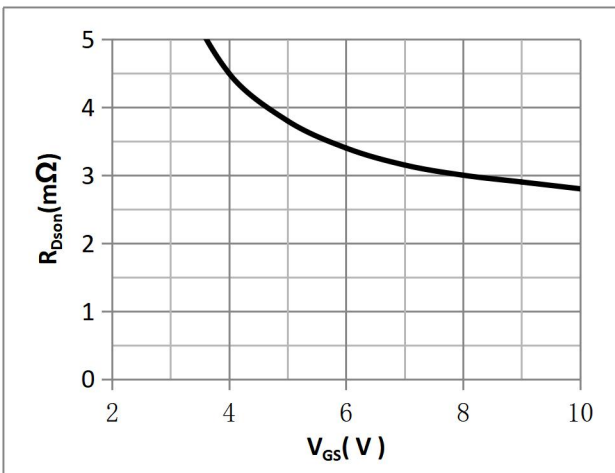
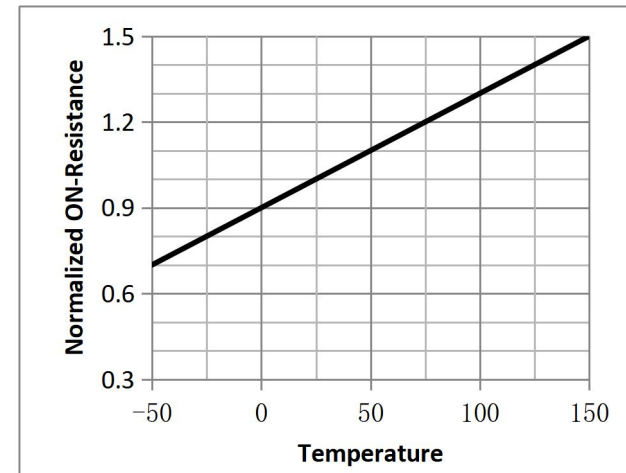
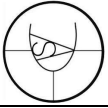


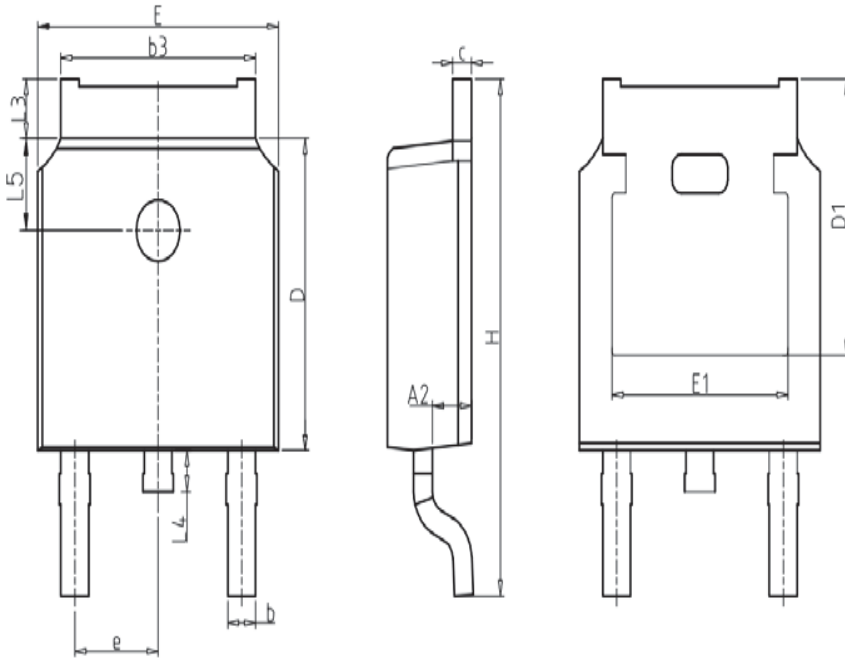
Fig.6 On-Resistance V.S Junction Temperature





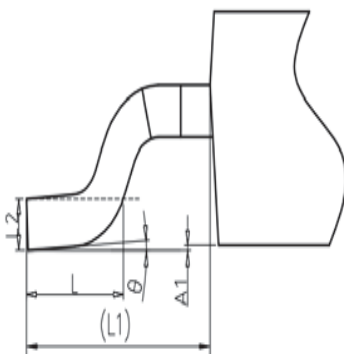
## Package Information

### TO-252-2L



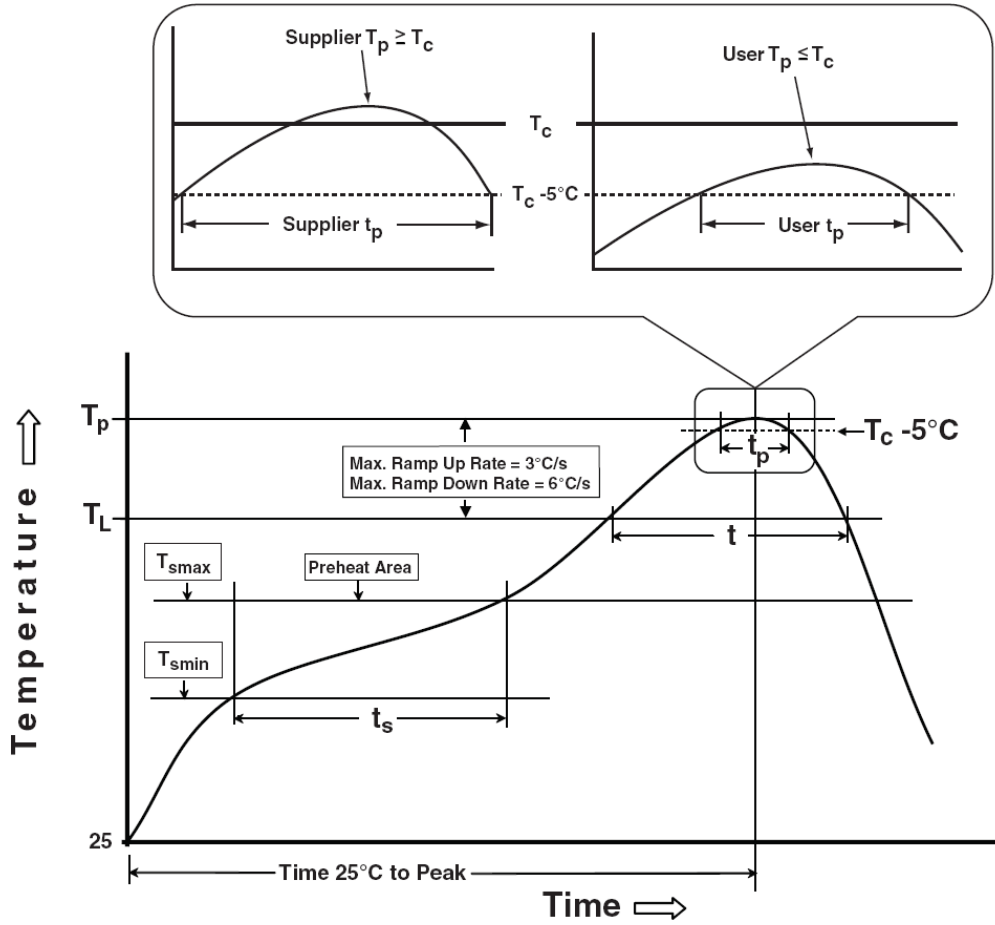
COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	2.20	2.30	2.40
A1	0.00	-	0.20
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b3	5.20	5.33	5.50
c	0.43	0.53	0.63
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.80
E1	4.63	-	-
e	2.286BSC		
H	9.40	10.10	10.50
L	1.38	1.50	1.75
L1	2.90REF		
L2	0.51BSC		
L3	0.88	-	1.28
L4	-	-	1.00
L5	1.65	1.80	1.95
$\theta$	0°	-	8°





# Classification Profile





## Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
<b>Preheat &amp; Soak</b>		
Temperature min ( $T_{smin}$ )	100 °C	150 °C
Temperature max ( $T_{smax}$ )	150 °C	200 °C
Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )	60-120 seconds	60-120 seconds
Average ramp-up rate ( $T_{smax}$ to $T_p$ )	3 °C/second max.	3°C/second max.
Liquidous temperature ( $T_L$ )	183 °C	217 °C
Time at liquidous ( $t_L$ )	60-150 seconds	60-150 seconds
Peak package body Temperature ( $T_p$ )*	See Classification Temp in table 1	See Classification Temp in table 2
Time ( $t_p$ )** within 5°C of the specified classification temperature ( $T_c$ )	20** seconds	30** seconds
Average ramp-down rate ( $T_p$ to $T_{smax}$ )	6 °C/second max.	6 °C/second max.
Time 25°C to peak temperature	6 minutes max.	8 minutes max.
* Tolerance for peak profile Temperature ( $T_p$ ) is defined as a supplier minimum and a user maximum. ** Tolerance for time at peak profile temperature ( $t_p$ ) is defined as a supplier minimum and a user maximum.		

Table 1. SnPb Eutectic Process – Classification Temperatures ( $T_c$ )

Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

Table 2. Pb-free Process – Classification Temperatures ( $T_c$ )

Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> 350-2000	Volume mm <sup>3</sup> >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 mm – 2.5 mm	260 °C	250 °C	245 °C
≥2.5 mm	250 °C	245 °C	245 °C

## Reliability Test Program

Test item	Method	Description
SOLDERABILITY	JESD-22, B102	5 Sec, 245°C
HOLT	JESD-22, A108	168 Hrs /500 Hrs /1000 Hrs, Bias @ 150°C
PCT	JESD-22, A102	96 Hrs, 100%RH, 2atm, 121°C
TCT	JESD-22, A104	500 Cycles, -55°C~150°C