



SANYO Semiconductors

## DATA SHEET

An ON Semiconductor Company

N-Channel Silicon MOSFET

# WPH4003 — General-Purpose Switching Device Applications

## Features

- ON-resistance  $R_{DS(on)} = 8.2\Omega$  (typ.)
- Input Capacitance  $C_{iss} = 850\text{pF}$  (typ.)
- 10V drive

## Specifications

Absolute Maximum Ratings at  $T_a = 25^\circ\text{C}$ 

Parameter	Symbol	Conditions	Ratings	Unit
Drain-to-Source Voltage	$V_{DSS}$		1700	V
Gate-to-Source Voltage	$V_{GSS}$		$\pm 30$	V
Drain Current (DC)	$I_{Dc}^{*1}$	Limited only maximum temperature $T_{ch} = 150^\circ\text{C}$	3	A
	$I_{Dpack}^{*2}$	$T_c = 25^\circ\text{C}$ (SANYO's ideal heat dissipation condition) $^{*3}$	2.5	A
Drain Current (Pulse)	$I_{DP}$	$PW \leq 10\mu\text{s}$ , duty cycle $\leq 1\%$	6	A
Allowable Power Dissipation	$P_D$		3.0	W
		$T_c = 25^\circ\text{C}$	55	W
Channel Temperature	$T_{ch}$		150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$
Avalanche Energy (Single Pulse) $^{*4}$	$E_{AS}$		49	mJ
Avalanche Current $^{*5}$	$I_{AV}$		3	A

Note :  $^{*1}$  Shows chip capability $^{*2}$  Package limited $^{*3}$  SANYO's condition is radiation from backside.

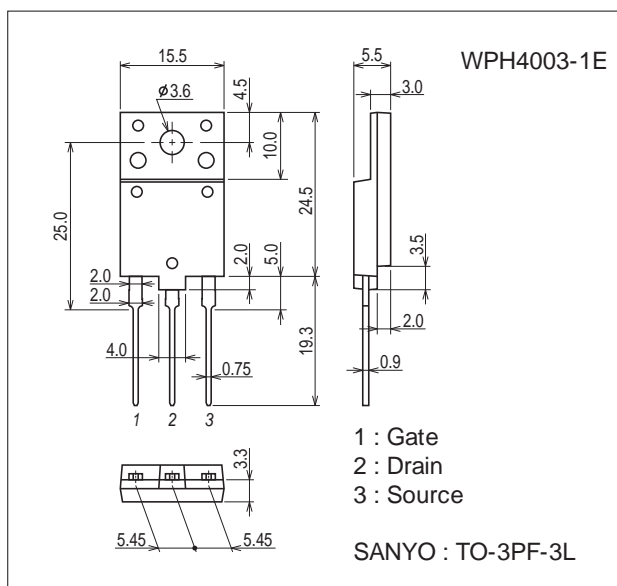
The method is applying silicone grease to the backside of the device and attaching the device to water-cooled radiator made of aluminium.

 $^{*4}$   $V_{DD} = 50\text{V}$ ,  $L = 10\text{mH}$ ,  $I_{AV} = 3\text{A}$  (Fig.1) $^{*5}$   $L \leq 10\text{mH}$ , single pulse

## Package Dimensions

unit : mm (typ)

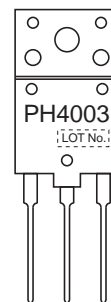
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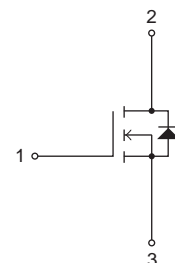
## Product & Package Information

- Package : TO-3PF-3L
- JEITA, JEDEC : SC-96
- Minimum Packing Quantity : 30 pcs./magazine

## Marking



## Electrical Connection



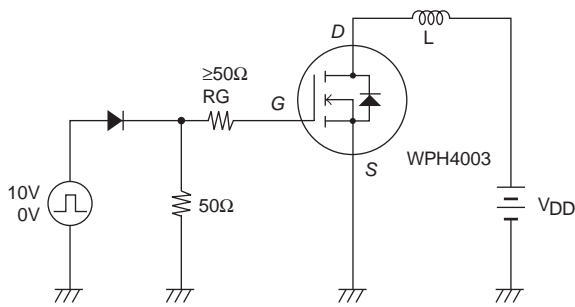
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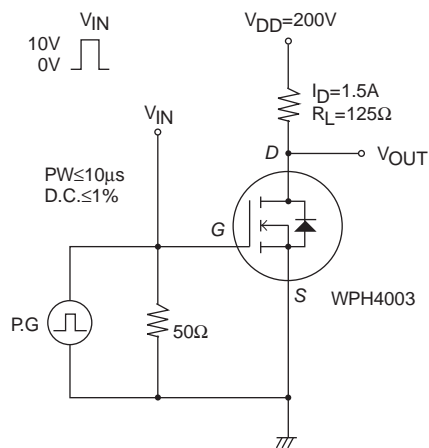
**Electrical Characteristics** at  $T_a=25^{\circ}\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D=10\text{mA}$ , $V_{GS}=0\text{V}$	1700			V
Zero-Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=1360\text{V}$ , $V_{GS}=0\text{V}$			1	mA
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 30\text{V}$ , $V_{DS}=0\text{V}$			$\pm 100$	nA
Cutoff Voltage	$V_{GS(off)}$	$V_{DS}=10\text{V}$ , $I_D=1\text{mA}$	2		4	V
Forward Transfer Admittance	$ y_{fs} $	$V_{DS}=20\text{V}$ , $I_D=1.5\text{A}$	1.2	2.4		S
Static Drain-to-Source On-State Resistance	$R_{DS(on)}$	$I_D=1.5\text{A}$ , $V_{GS}=10\text{V}$		8.2	10.5	$\Omega$
Input Capacitance	$C_{iss}$	$V_{DS}=30\text{V}$ , $f=1\text{MHz}$		850		pF
Output Capacitance	$C_{oss}$			90		pF
Reverse Transfer Capacitance	$C_{rss}$			27		pF
Turn-ON Delay Time	$t_{d(on)}$	See Fig.2		19		ns
Rise Time	$t_r$			21		ns
Turn-OFF Delay Time	$t_{d(off)}$			200		ns
Fall Time	$t_f$			55		ns
Total Gate Charge	$Q_g$	$V_{DS}=200\text{V}$ , $V_{GS}=10\text{V}$ , $I_D=3\text{A}$		48		nC
Gate-to-Source Charge	$Q_{gs}$			6		nC
Gate-to-Drain "Miller" Charge	$Q_{gd}$			22		nC
Diode Forward Voltage	$V_{SD}$	$I_S=3\text{A}$ , $V_{GS}=0\text{V}$		0.8	1.5	V
Reverse Recovery Time	$t_{rr}$	See Fig.3		410		ns
Reverse Recovery Charge	$Q_{rr}$			3000		nC

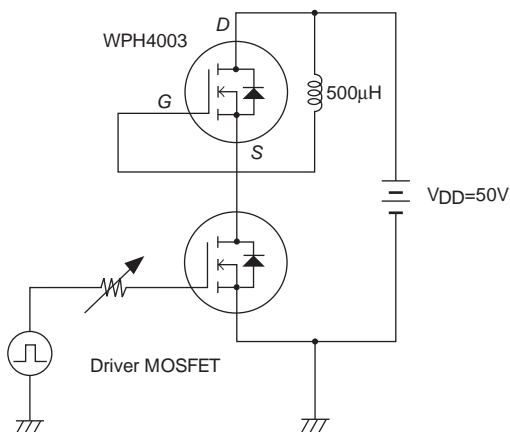
**Fig.1 Unclamped Inductive Switching Test Circuit**



**Fig.2 Switching Time Test Circuit**

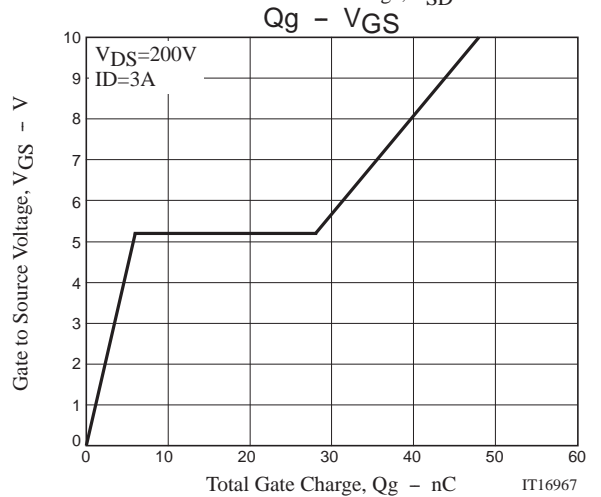
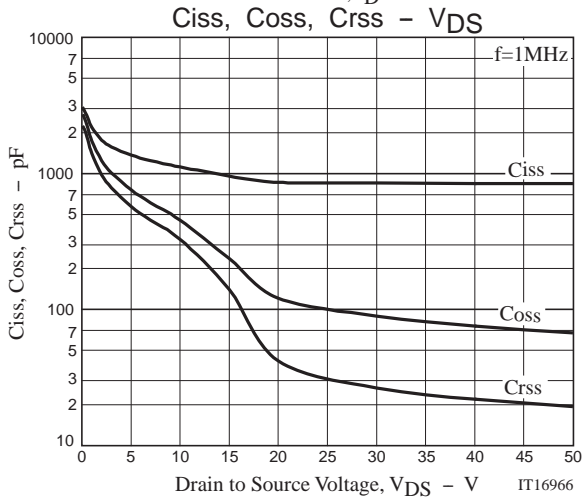
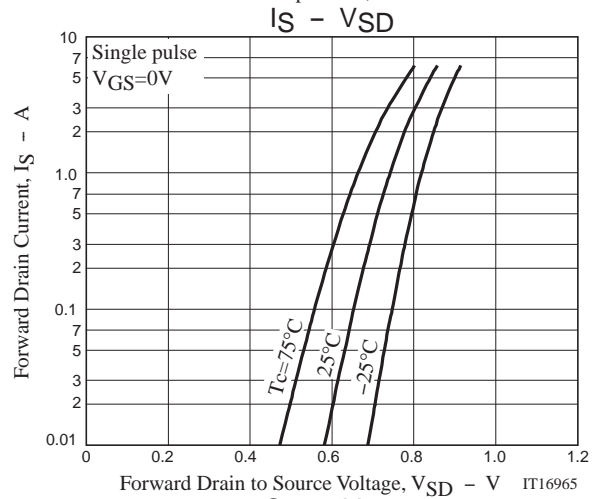
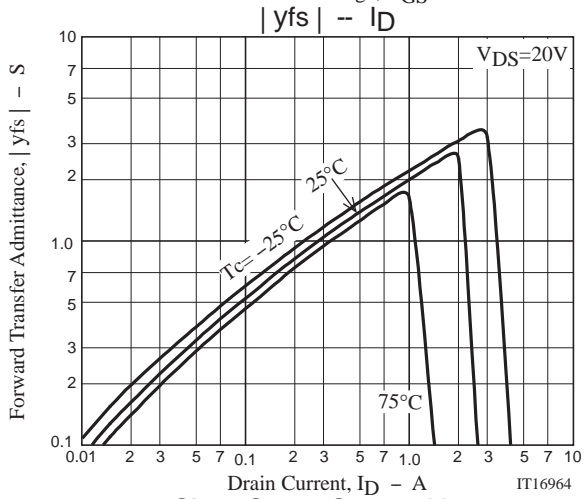
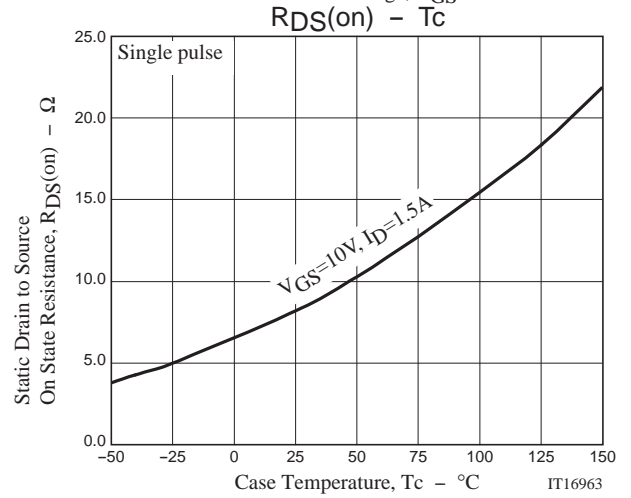
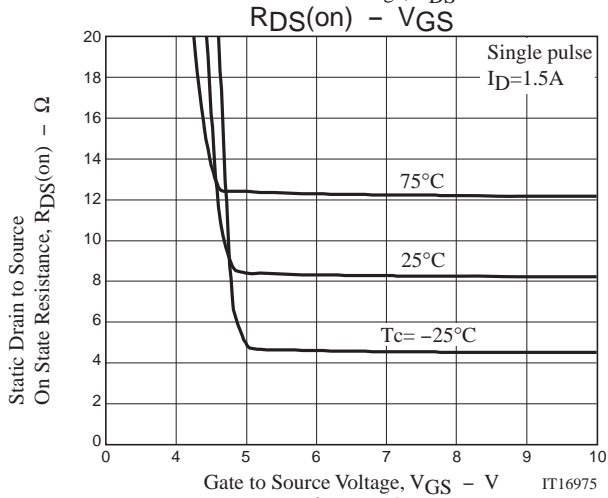
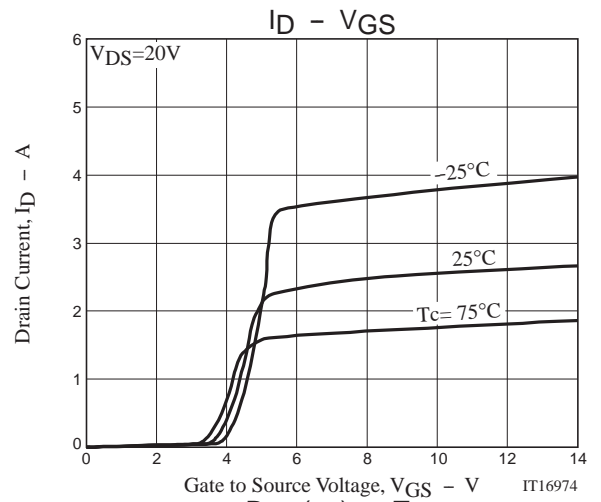
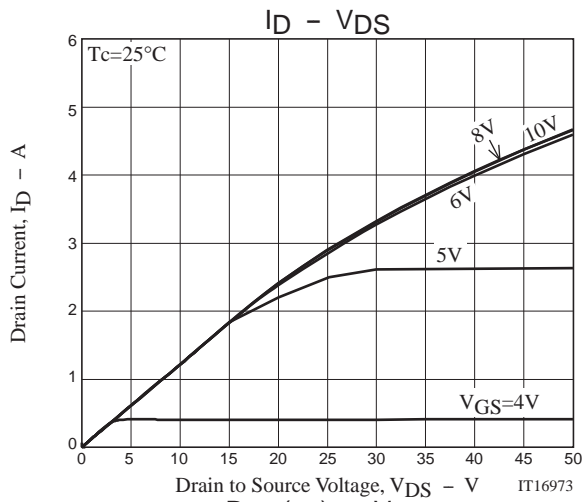


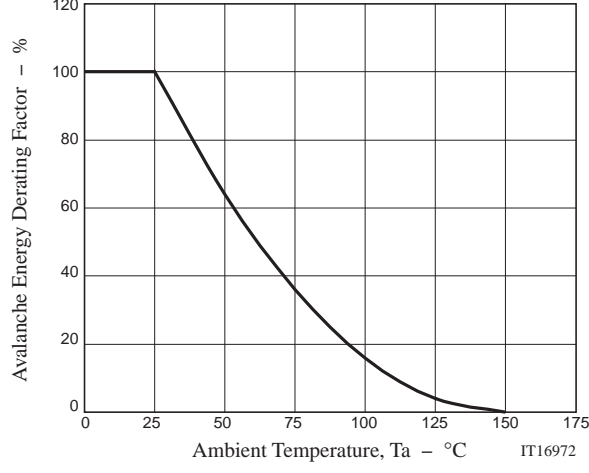
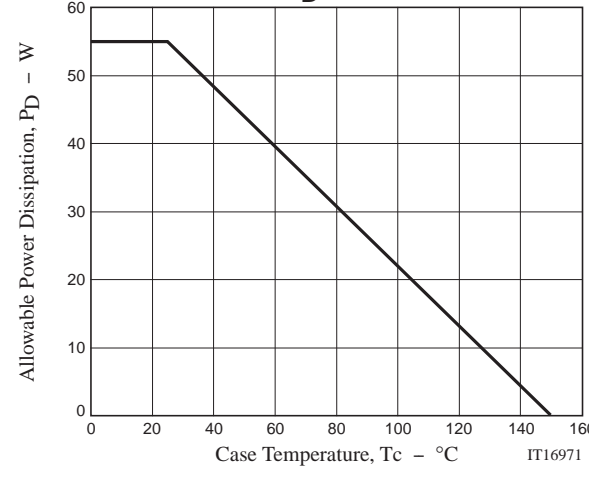
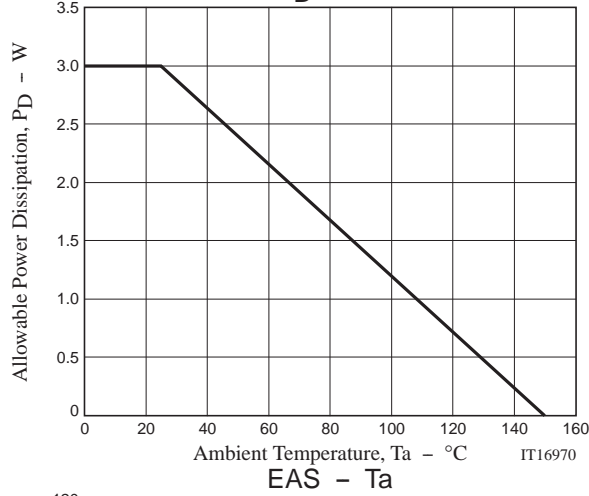
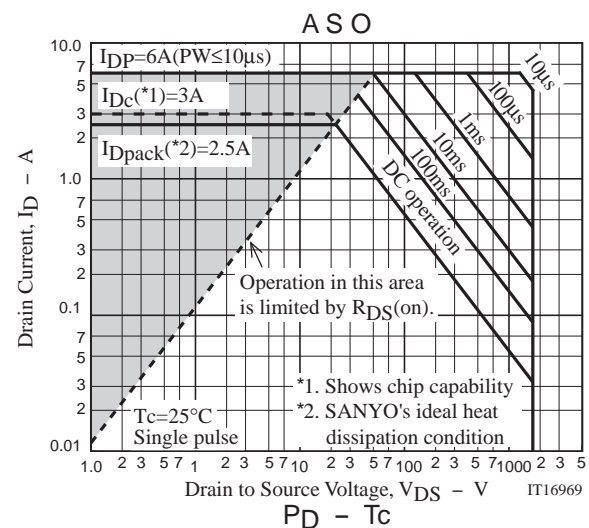
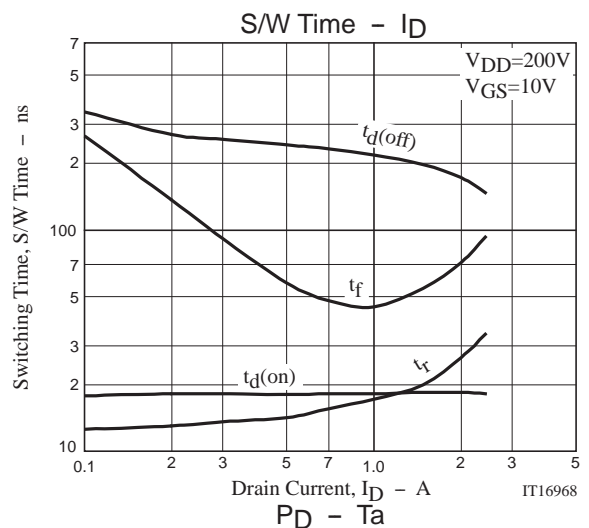
**Fig.3 Reverse Recovery Time Test Circuit**



**Ordering Information**

Device	Package	Shipping	memo
WPH4003-1E	TO-3PF-3L	30pcs./magazine	Pb Free





## Magazine Specification

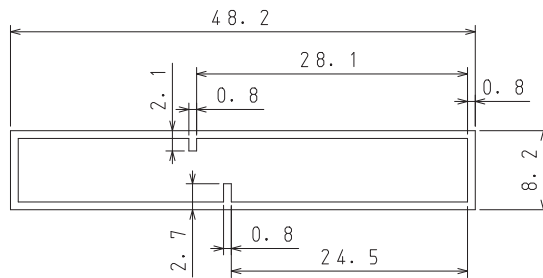
WPH4003-1E

### 1. Packing Format

Package Name	Maximum Number of devices contained (pcs)			Packing format	
	Magazine	Inner box	Outer box	Inner BOX	Outer BOX
TO-3PF-3L	30	360	1440	SPD-0V0001 12 magazines contained Dimensions:mm (external) 568×150×55	SPD-LV0010 4 inner boxes contained Dimensions:mm (external) 590×225×178

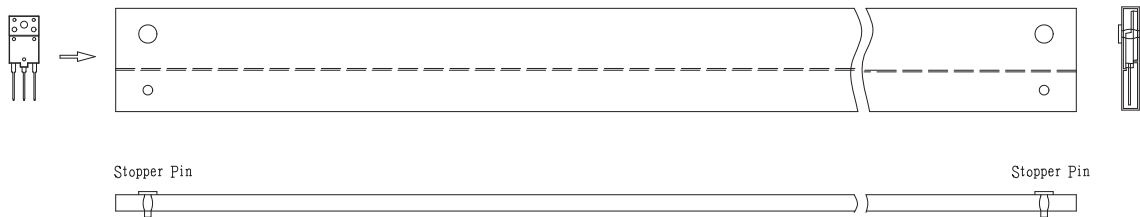
### 2. Magazine dimensions

(unit:mm)

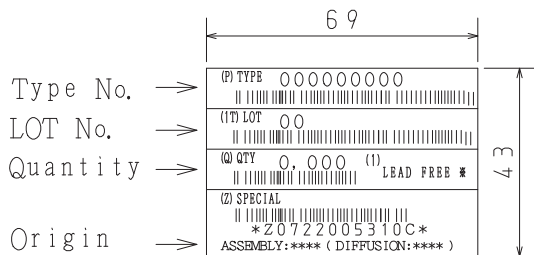


Tolerance=±0.2mm  
Thickness=0.8±0.2mm  
Length =508.0±1mm  
Material =PVC or PET  
(Antistatic treatment)

### 3. Storage method to magazine

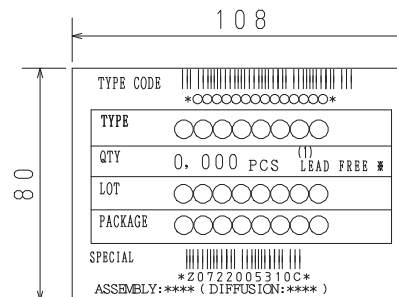


### 4. Inner box label (unit:mm)



### 5. Outer box label (unit:mm)

It is a label at the time of factory shipments.  
The form of a label may change in physical  
distribution process.

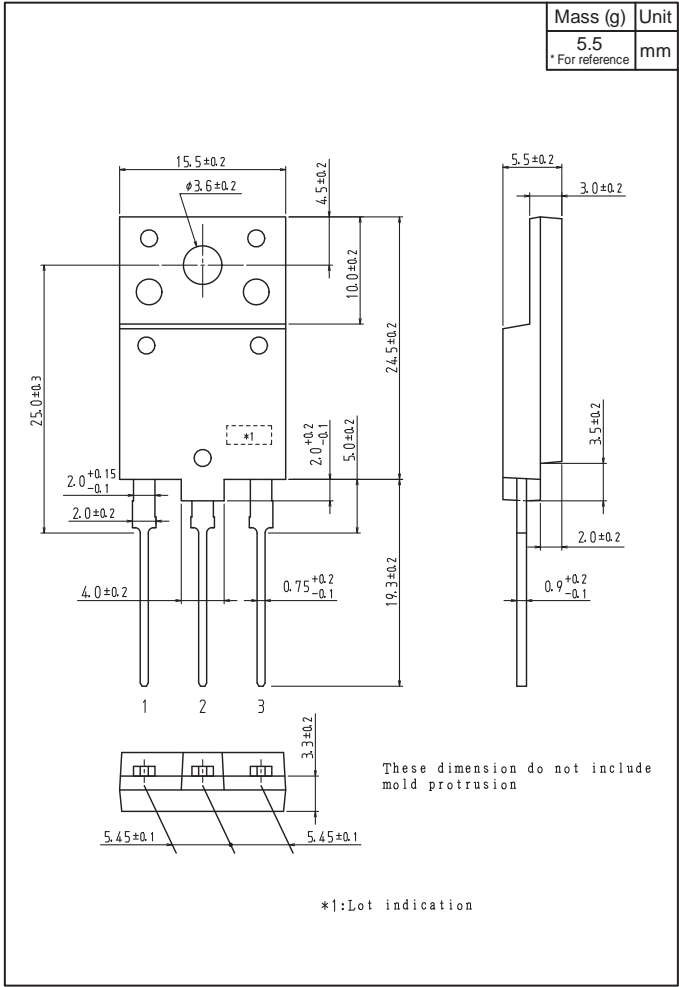


NOTE (1)

The LEAD FREE \* description shows that the  
surface treatment of the terminal is lead free.

Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A

Outline Drawing  
WPH4003-1E



Note on usage : Since the WPH4003 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

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