

## N-Channel Enhancement Mode MOSFET

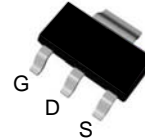
### Features

- 200V/1.1A,  
 $R_{DS(ON)} = 1140m\Omega(\text{max.}) @ V_{GS} = 10V$   
 $R_{DS(ON)} = 1300m\Omega(\text{max.}) @ V_{GS} = 4.5V$
- 100% UIS+Rg tested
- Reliable and Rugged
- Lead Free and Green Devices Available  
 (RoHS Compliant)

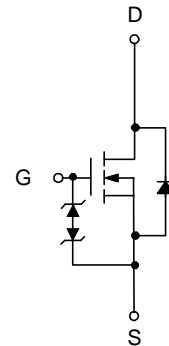
### Applications

- Power Management in TV Inverter.

### Pin Description



Top View SOT-223



N-Channel MOSFET

### DEVICE MARKING AND ORDERING INFORMATION

Device	Marking	Shipping
FTK2A18NS	2A18N	2500/Tape&Reel



# FTK2A18NS

## Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Rating	Unit
<b>Common Ratings</b>			
$V_{DSS}$	Drain-Source Voltage	200	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	
$T_J$	Maximum Junction Temperature	150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150	
$I_S$	Diode Continuous Forward Current	$T_A=25^\circ\text{C}$ 1.1	A
$I_D$	Continuous Drain Current	$T_A=25^\circ\text{C}$ 1.1	A
		$T_A=70^\circ\text{C}$ 0.9	
$I_{DM}^a$	Pulsed Drain Current	$T_A=25^\circ\text{C}$ 4	A
$P_D$	Maximum Power Dissipation	$T_A=25^\circ\text{C}$ 3.5	W
		$T_A=70^\circ\text{C}$ 2.2	
$R_{\theta JA}^b$	Thermal Resistance-Junction to Ambient	$t \leq 10\text{s}$ 35	$^\circ\text{C}/\text{W}$
		Steady State 75	$^\circ\text{C}/\text{W}$
$I_{AS}^c$	Avalanche Current, Single pulse (L=0.5mH)	1	A
$E_{AS}^c$	Avalanche Energy, Single pulse (L=0.5mH)	0.25	mJ

Note a: Pulse width is limited by maximum junction temperature.

b: Surface Mounted on  $1\text{in}^2$  pad area.

c: UIS tested and pulse width are limited by maximum junction temperature  $150^\circ\text{C}$  (initial temperature  $T_f=25^\circ\text{C}$ ).



# FTK2A18NS

## Electrical Characteristics (T<sub>A</sub> = 25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA	200	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =160V, V <sub>GS</sub> =0V T <sub>J</sub> =85°C	-	-	1	μA
			-	-	30	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA	1	2	3	V
I <sub>GSS</sub>	Gate Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±10	μA
R <sub>DS(ON)</sub> <sup>d</sup>	Drain-Source On-state Resistance	V <sub>GS</sub> =10V, I <sub>DS</sub> =0.5A	-	950	1140	mΩ
		V <sub>GS</sub> =4.5V, I <sub>DS</sub> =0.5A		1000	1300	mΩ
<b>Diode Characteristics</b>						
V <sub>SD</sub> <sup>d</sup>	Diode Forward Voltage	I <sub>SD</sub> =1A, V <sub>GS</sub> =0V	-	0.8	1.3	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>SD</sub> =1A, di <sub>SD</sub> /dt=100A/μs	-	51	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge		-	54	-	nC
<b>Dynamic Characteristics<sup>e</sup></b>						
R <sub>G</sub>	Gate Resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz	-	3.7	-	Ω
C <sub>iSS</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =30V, Frequency=1.0MHz	-	250	325	pF
C <sub>oss</sub>	Output Capacitance		-	16	-	
C <sub>rSS</sub>	Reverse Transfer Capacitance		-	4	-	
t <sub>d(ON)</sub>	Turn-on Delay Time		V <sub>DD</sub> =30V, R <sub>L</sub> =30Ω, I <sub>DS</sub> =1A, V <sub>GEN</sub> =10V, R <sub>G</sub> =6Ω	-	8	
t <sub>r</sub>	Turn-on Rise Time	-		6	11	
t <sub>d(OFF)</sub>	Turn-off Delay Time	-		13	24	
t <sub>f</sub>	Turn-off Fall Time	-		8	15	
<b>Gate Charge Characteristics<sup>e</sup></b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =100V, V <sub>GS</sub> =4.5V, I <sub>DS</sub> =1A	-	2.5	-	nC
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =100V, V <sub>GS</sub> =10V, I <sub>DS</sub> =1A	-	5.3	7.5	
Q <sub>gs</sub>	Gate-Source Charge		-	1.1	-	
Q <sub>gd</sub>	Gate-Drain Charge		-	0.7	-	

Note d: Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.

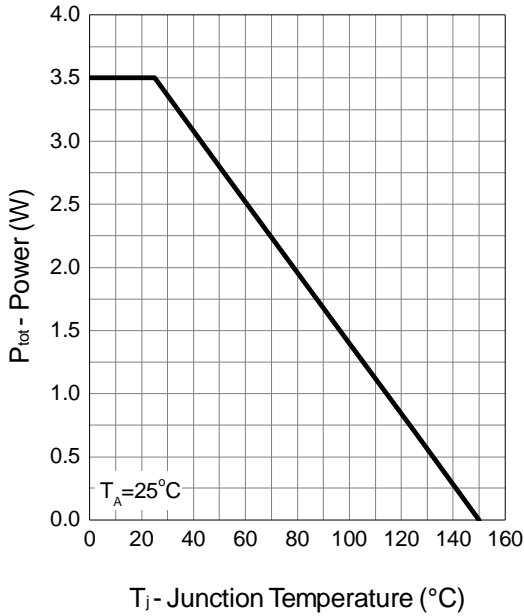
e: Guaranteed by design, not subject to production testing.



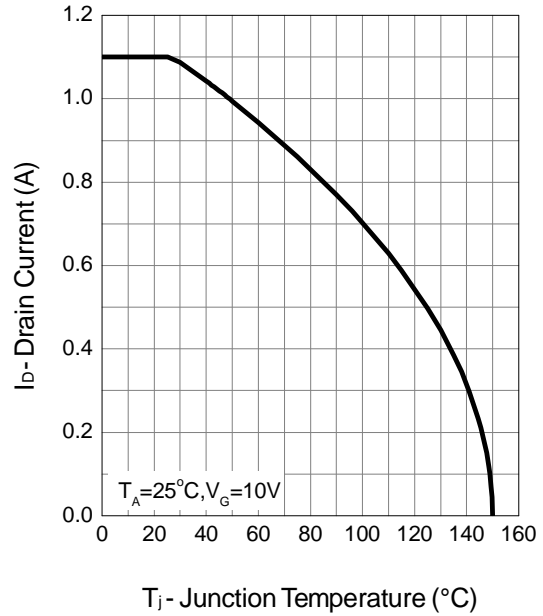
# FTK2A18NS

## Typical Operating Characteristics

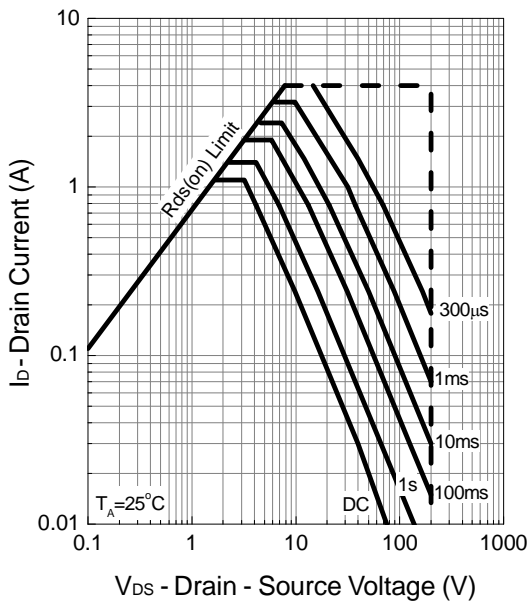
### Power Dissipation



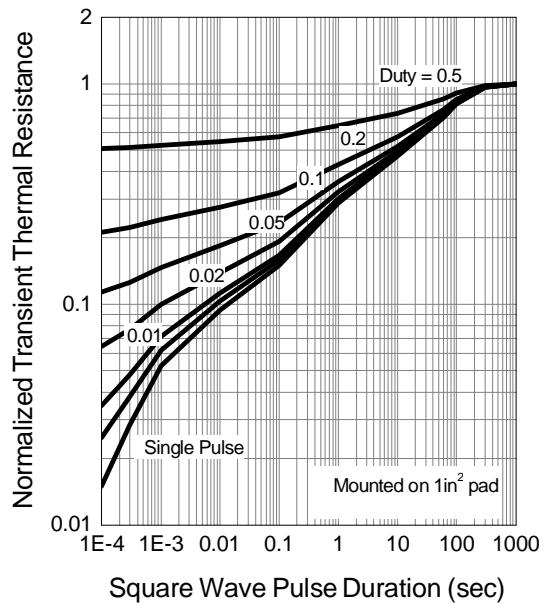
### Drain Current



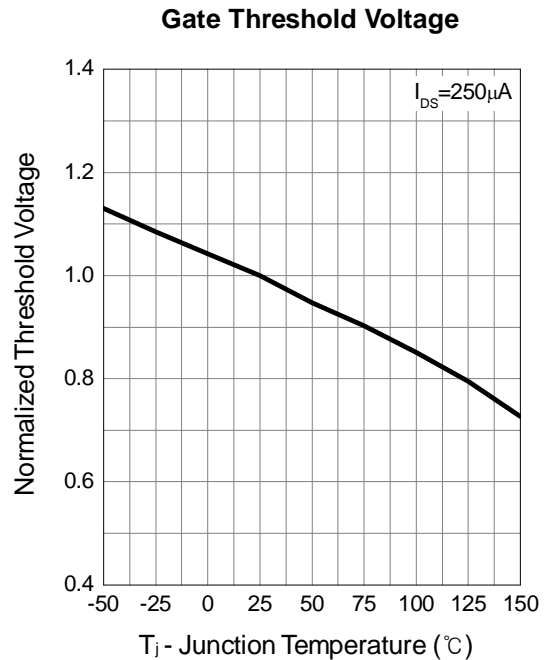
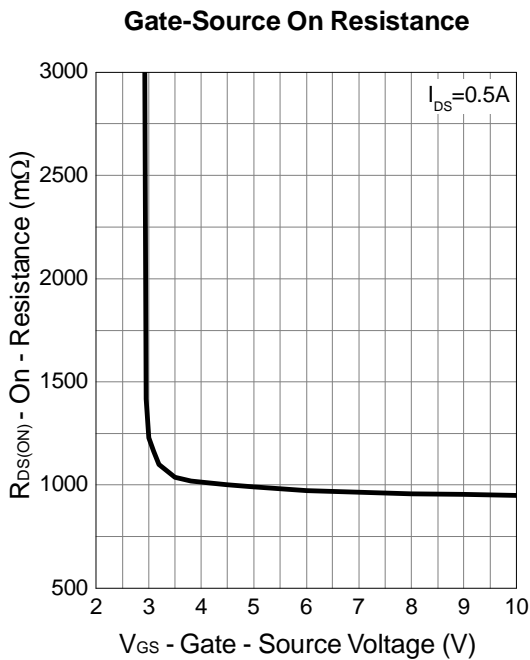
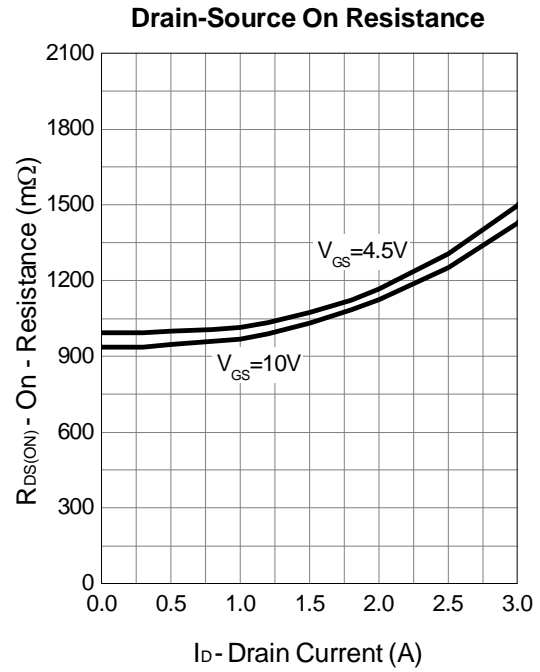
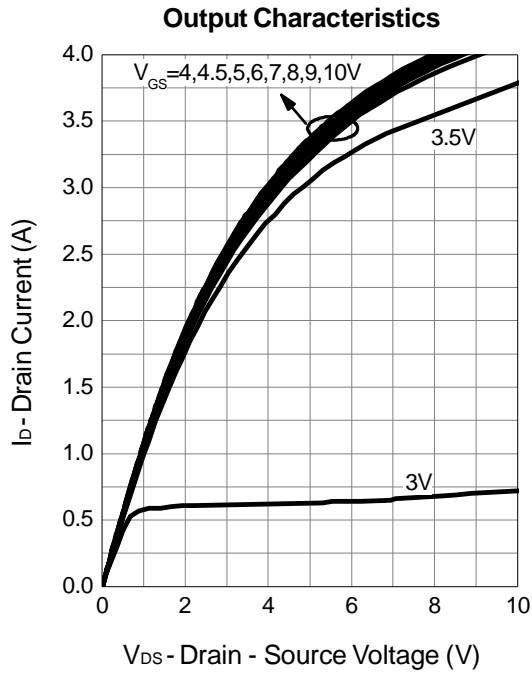
### Safe Operation Area



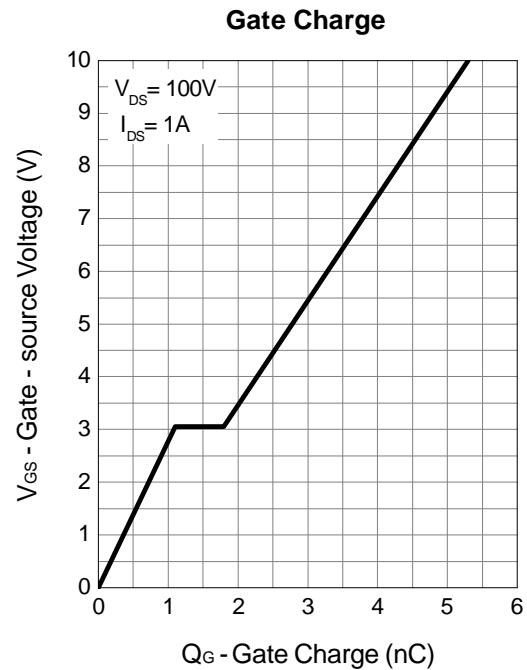
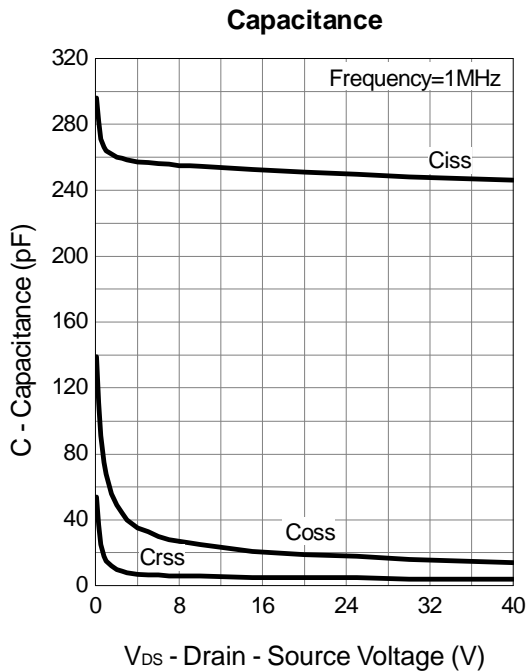
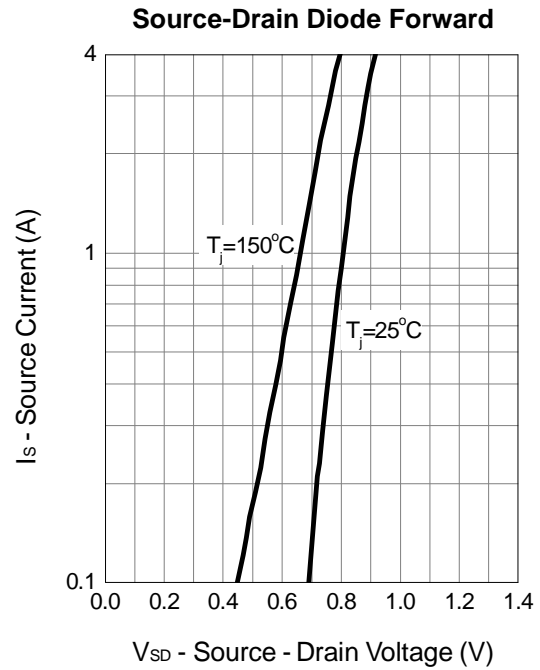
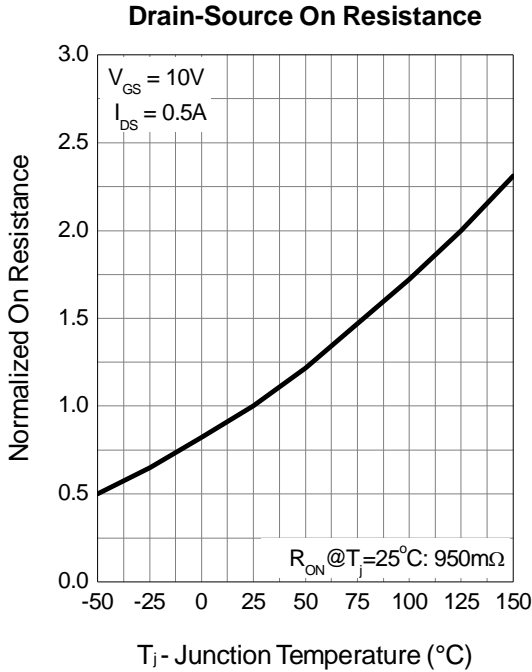
### Thermal Transient Impedance



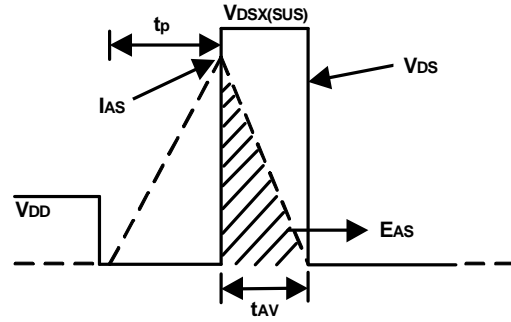
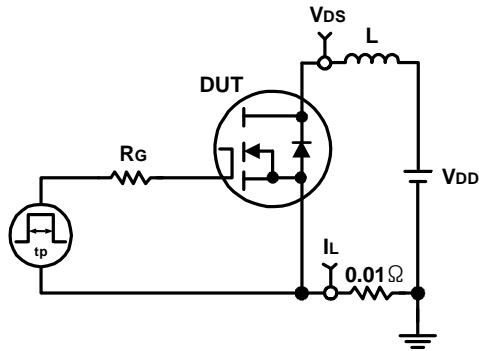
## Typical Operating Characteristics (Cont.)



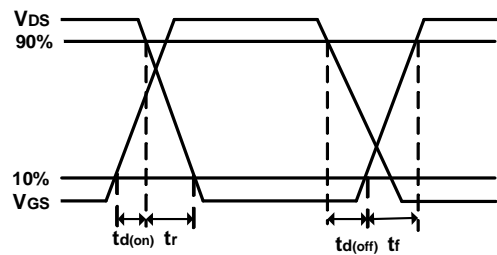
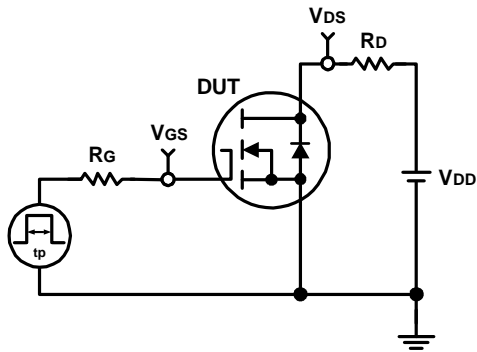
## Typical Operating Characteristics (Cont.)



## Avalanche Test Circuit and Waveforms

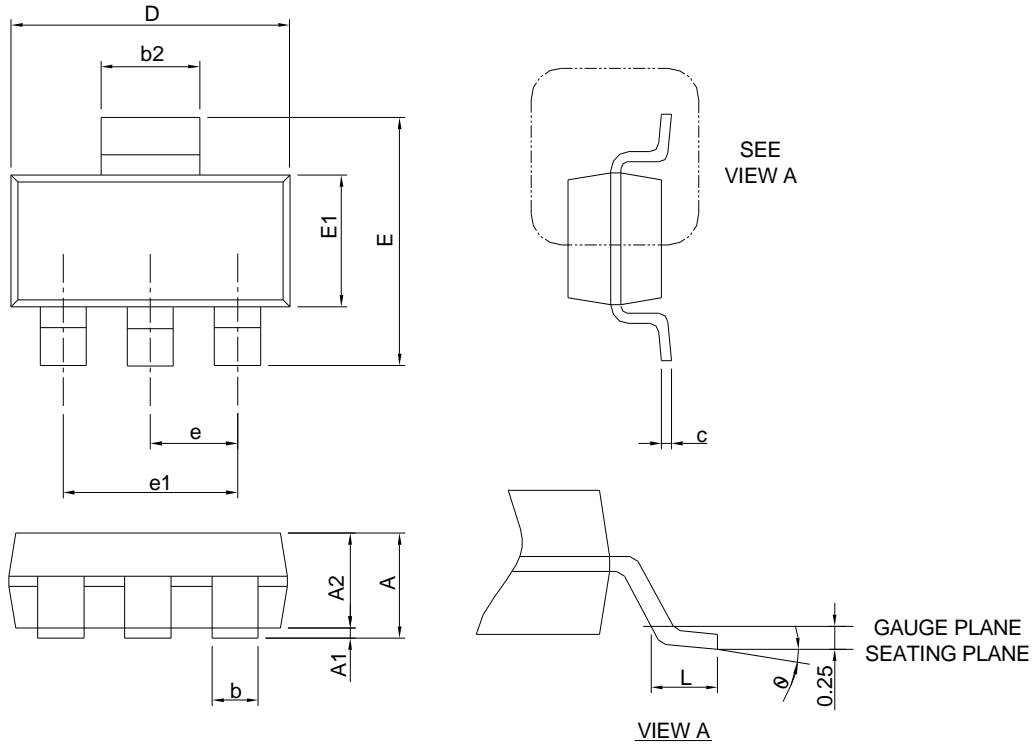


## Switching Time Test Circuit and Waveforms



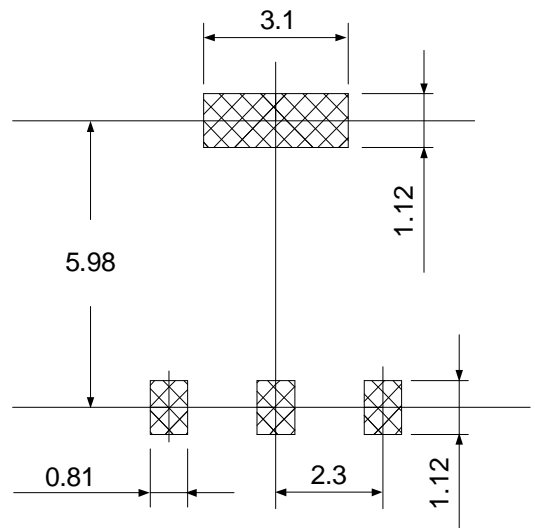
## Package Information

SOT-223



SYM BOL	SOT-223			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A		1.80		0.071
A1	0.02	0.10	0.001	0.004
A2	1.50	1.70	0.059	0.067
b	0.66	0.84	0.026	0.033
b2	2.90	3.10	0.114	0.122
c	0.23	0.33	0.009	0.013
D	6.30	6.70	0.248	0.264
E	6.70	7.30	0.264	0.287
E1	3.30	3.70	0.130	0.146
e	2.30 BSC		0.091 BSC	
e1	4.60 BSC		0.181 BSC	
L	0.75		0.030	
θ	0	10	0	10

### RECOMMENDED LAND PATTERN

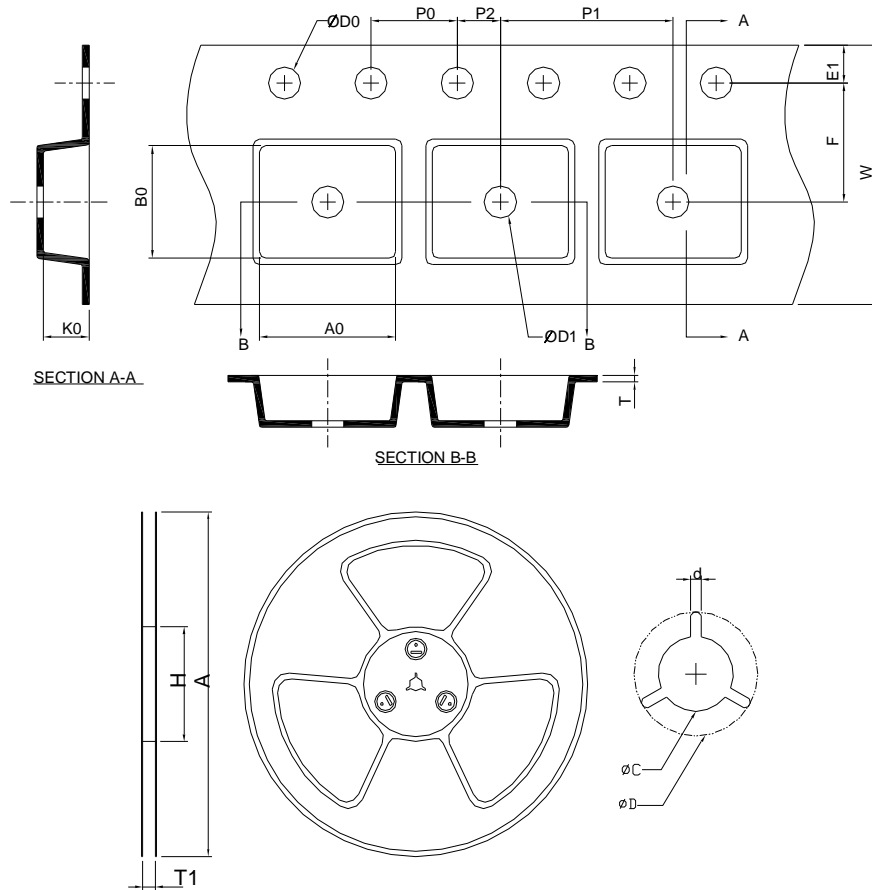


UNIT: mm

- Note : 1. Follow from JEDEC TO-261 AA.  
 2. Dimension D and E1 are determined at the outermost extremes of the plastic exclusive of mold flash, tie bar burrs, gate burrs, and interlead flash, but including any mismatch between the top and bottom of the plastic body.



## Carrier Tape & Reel Dimensions

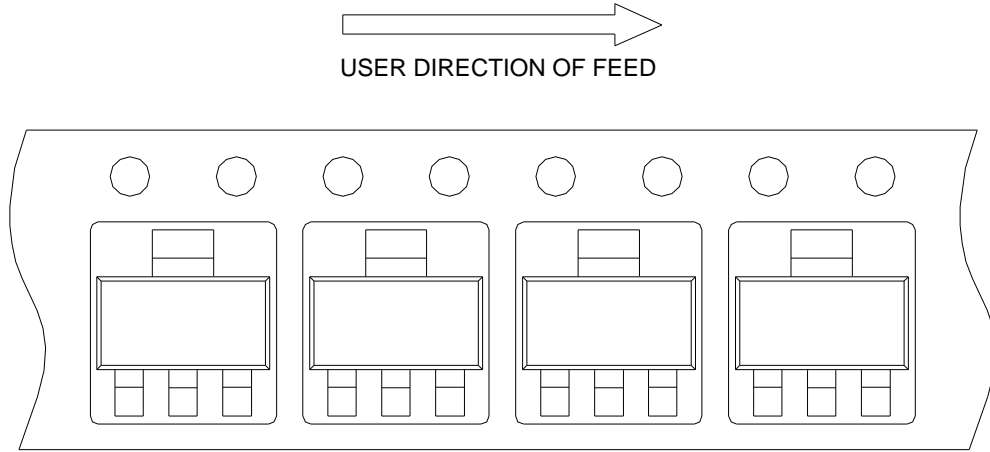


Application	A	H	T1	C	d	D	W	E1	F
SOT-223	320.0 2.00	50 MIN.	12.4+2.00 -0.00	13.0+0.50 -0.20	1.5 MIN.	20.2 MIN.	12.00 0.30	1.75 0.10	5.50 0.05
	<b>P0</b>	<b>P1</b>	<b>P2</b>	<b>D0</b>	<b>D1</b>	<b>T</b>	<b>A0</b>	<b>B0</b>	<b>K0</b>
	4.00 0.10	8.00 0.10	2.00 0.50	1.5+0.10 -0.00	1.5 MIN.	0.6+0.00 -0.40	6.90 0.20	7.50 0.20	2.10 0.20

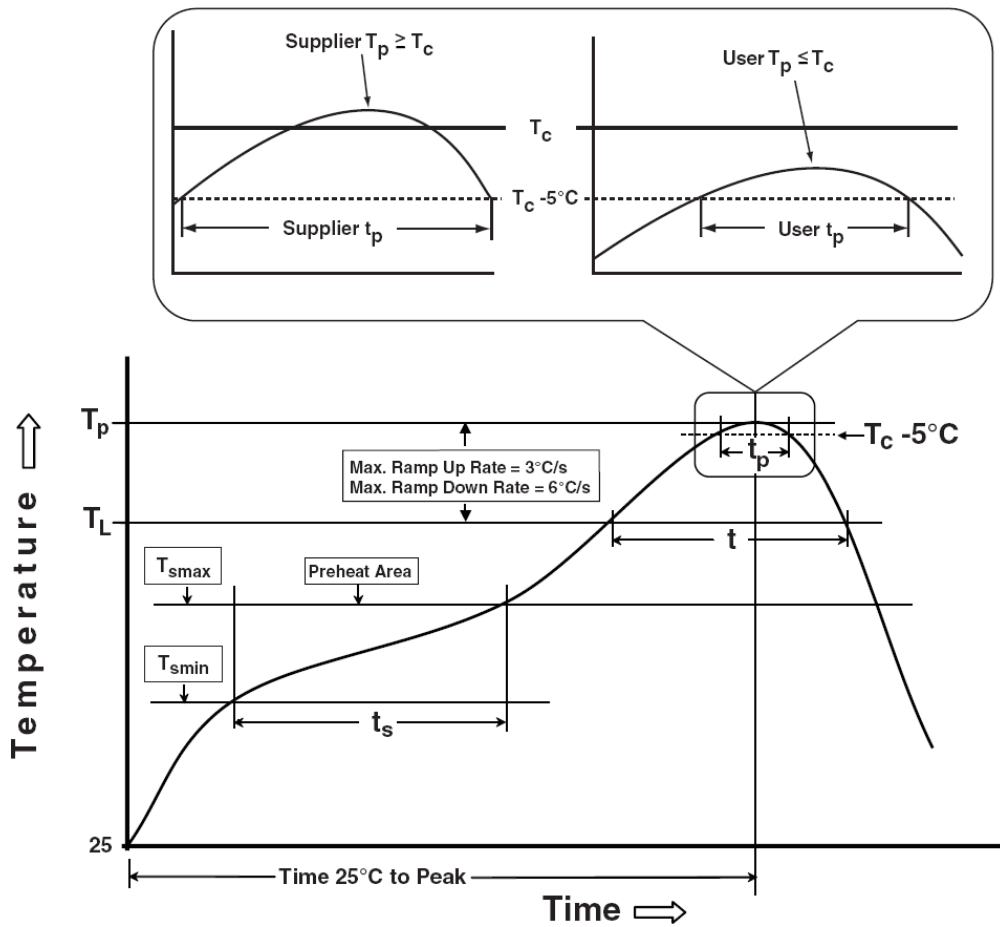
(mm)

## Taping Direction Information

SOT-223



## Classification Profile





# FTK2A18NS

## Classification Profile

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak Temperature min ( $T_{smin}$ ) Temperature max ( $T_{smax}$ ) Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )	100 °C 150 °C 60-120 seconds	150 °C 200 °C 60-120 seconds
Average ramp-up rate ( $T_{smax}$ to $T_P$ )	3 °C /second max.	3 °C /second max.
Liquidous temperature ( $T_L$ ) Time at liquidous ( $t_L$ )	183 °C 60-150 seconds	217 °C 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
HTRB	JESD-22, A108	1000 Hrs, 80% of VDS max @ $T_{jmax}$
HTGB	JESD-22, A108	1000 Hrs, 100% of VGS max @ $T_{jmax}$
PCT	JESD-22, A102	168 Hrs, 100%RH, 2atm, 121 °C
TCT	JESD-22, A104	500 Cycles, -65 °C ~150 °C