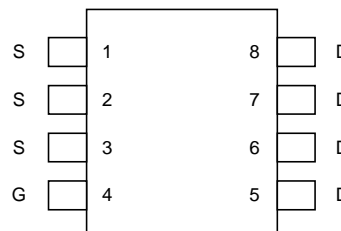


N-Channel Enhancement Mode MOSFET

### Features

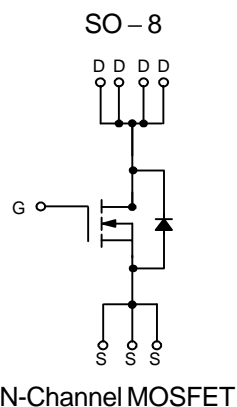
- 20V/4A,  $R_{DS(ON)} = 40m\Omega(\text{typ.}) @ V_{GS} = 4.5V$   
 $R_{DS(ON)} = 110m\Omega(\text{typ.}) @ V_{GS} = 2.5V$
- Super High Density Cell Design
- Reliable and Rugged
- SO-8 Package

### Pin Description



### Applications

- Power Management in Notebook Computer, Portable Equipment and Battery Powered Systems



### Ordering and Marking Information

<p>APM9430 □□-□□</p> <p style="margin-left: 20px;">└─── Handling Code</p> <p style="margin-left: 20px;">└─── Temp. Range</p> <p style="margin-left: 20px;">└─── Package Code</p>	<p>Package Code K : SO-8</p> <p>Operation Junction Temp. Range C : -55 to 150°C</p> <p>Handling Code TU : Tube TR : Tape &amp; Reel</p>
<p>APM9430</p> <div style="border: 1px solid black; display: inline-block; padding: 2px; margin-left: 100px;">             APM9430 XXXXXX         </div>	<p>XXXXXX - Date Code</p>

### Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Rating	Unit
$V_{DSS}$	Drain-Source Voltage	20	V
$V_{GSS}$	Gate-Source Voltage	$\pm 16$	
$I_D$	Maximum Drain Current – Continuous	4	A
$I_{DM}$	Maximum Drain Current – Pulsed	15	

ANPEC reserves the right to make changes to improve reliability or manufacturability without notice, and advise customers to obtain the latest version of relevant information to verify before placing orders.

**Absolute Maximum Ratings** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Rating	Unit
$P_D$	Maximum Power Dissipation	$T_A = 25^\circ\text{C}$	2.5
		$T_A = 100^\circ\text{C}$	1.0
$T_J$	Maximum Junction Temperature	150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150	
$R_{\theta JA}$	Thermal Resistance - Junction to Ambient	50	$^\circ\text{C}/\text{W}$

**Electrical Characteristics** ( $T_A=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Test Condition	APM9430			Unit
			Min.	Typ.	Max.	
<b>Static</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu\text{A}$	20			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=18V, V_{GS}=0V$			1	$\mu\text{A}$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu\text{A}$	0.7	0.9	1.5	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 16V, V_{DS}=0V$			$\pm 100$	nA
$R_{DS(ON)}^a$	Drain-Source On-state Resistance	$V_{GS}=4.5V, I_{DS}=4A$		40	54	m $\Omega$
		$V_{GS}=2.5V, I_{DS}=2A$		110	130	
$V_{SD}^a$	Diode Forward Voltage	$I_{SD}=2A, V_{GS}=0V$		0.75	1.3	V
<b>Dynamic<sup>b</sup></b>						
$Q_g$	Total Gate Charge	$V_{DS}=10V, V_{GS}=4.5V, I_D=1A$		6.6	13	nC
$Q_{gs}$	Gate-Source Charge			2.8		
$Q_{gd}$	Gate-Drain Charge			1		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=10V, I_D=1A, V_{GEN}=4.5V, R_G=0.2\Omega$		13	26	ns
$T_r$	Turn-on Rise Time			20	45	
$t_{d(OFF)}$	Turn-off Delay Time			50	110	
$T_f$	Turn-off Fall Time			20	85	
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=15V$ Frequency=1.0MHz		450		pF
$C_{oss}$	Output Capacitance			100		
$C_{riss}$	Reverse Transfer			60		

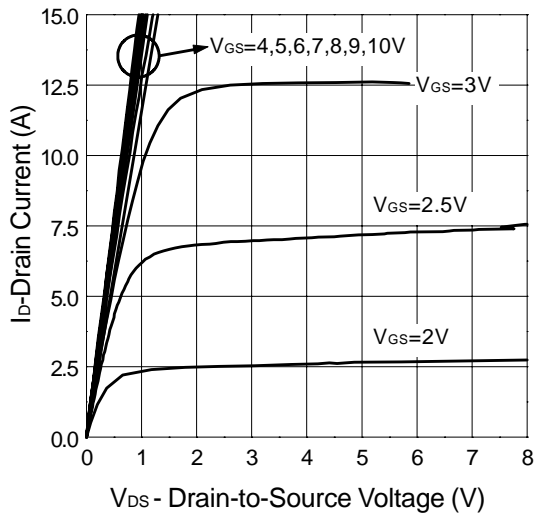
Notes

<sup>a</sup> : Guaranteed by design, not subject to production testing

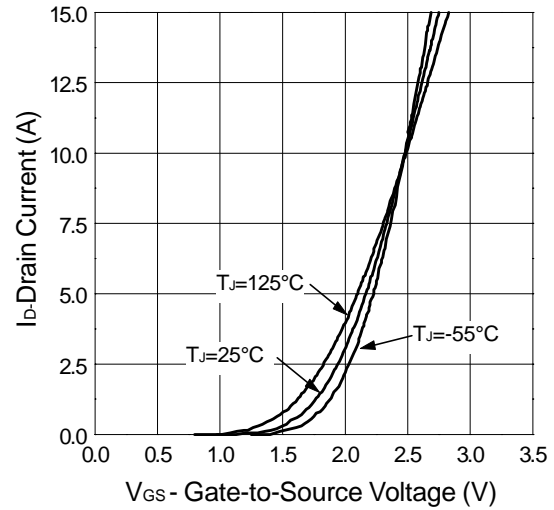
<sup>b</sup> : Pulse test ; pulse width  $\leq 500\mu\text{s}$ , duty cycle  $\leq 2\%$

## Typical Characteristics

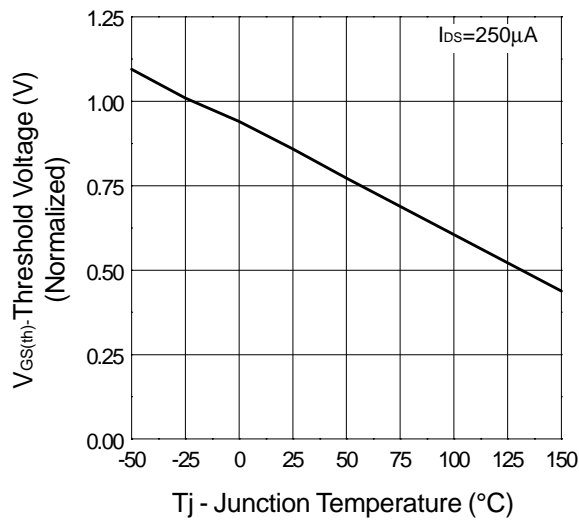
Output Characteristics



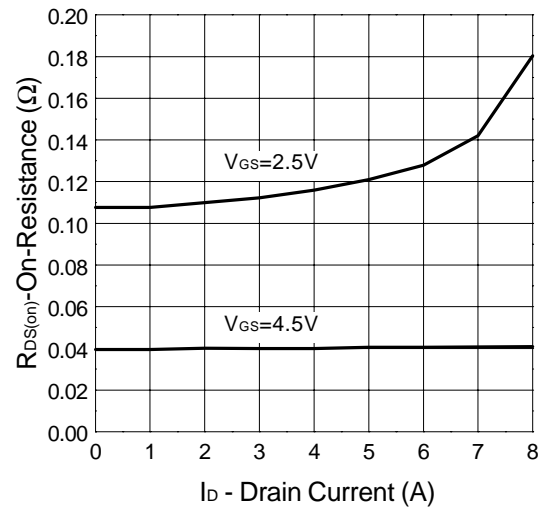
Transfer Characteristics



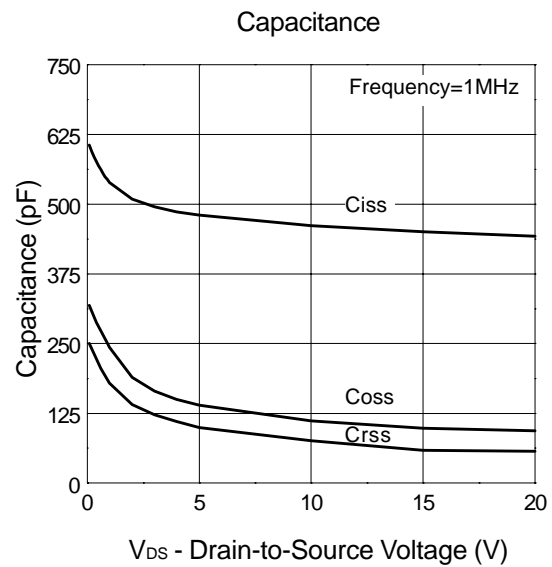
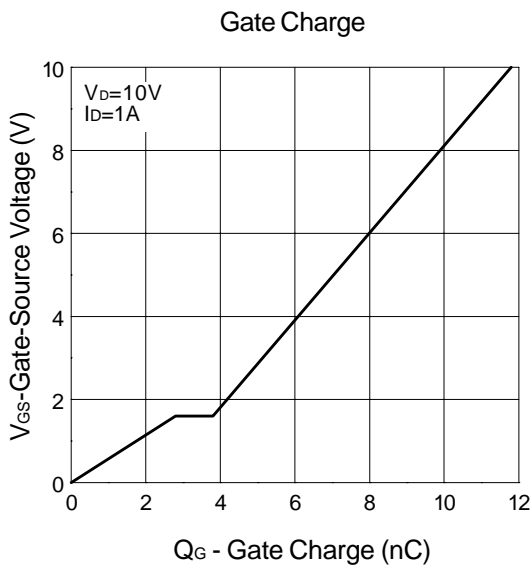
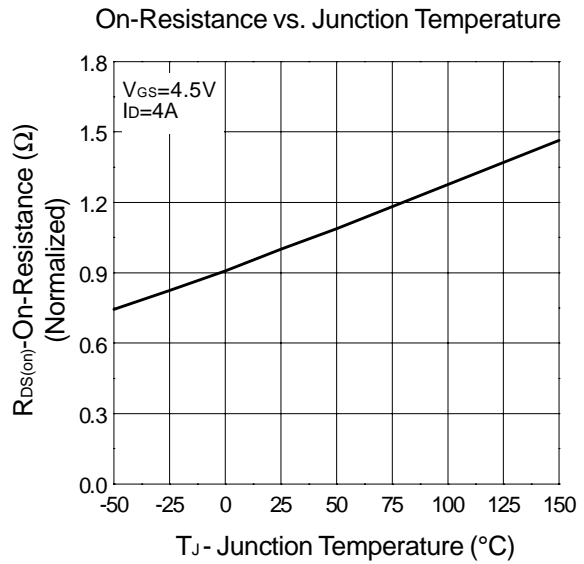
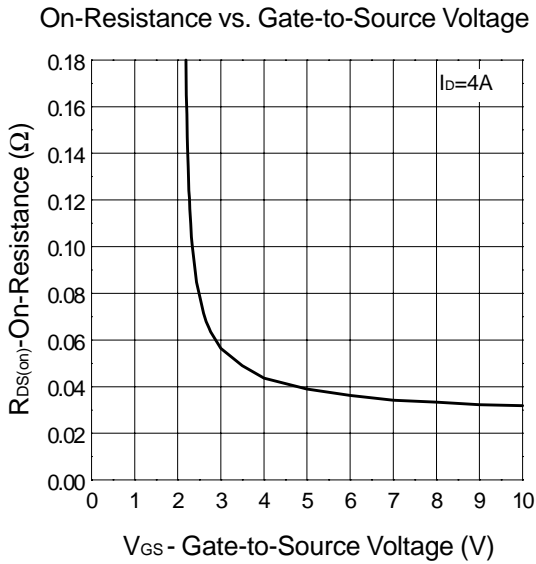
Threshold Voltage vs. Junction Temperature



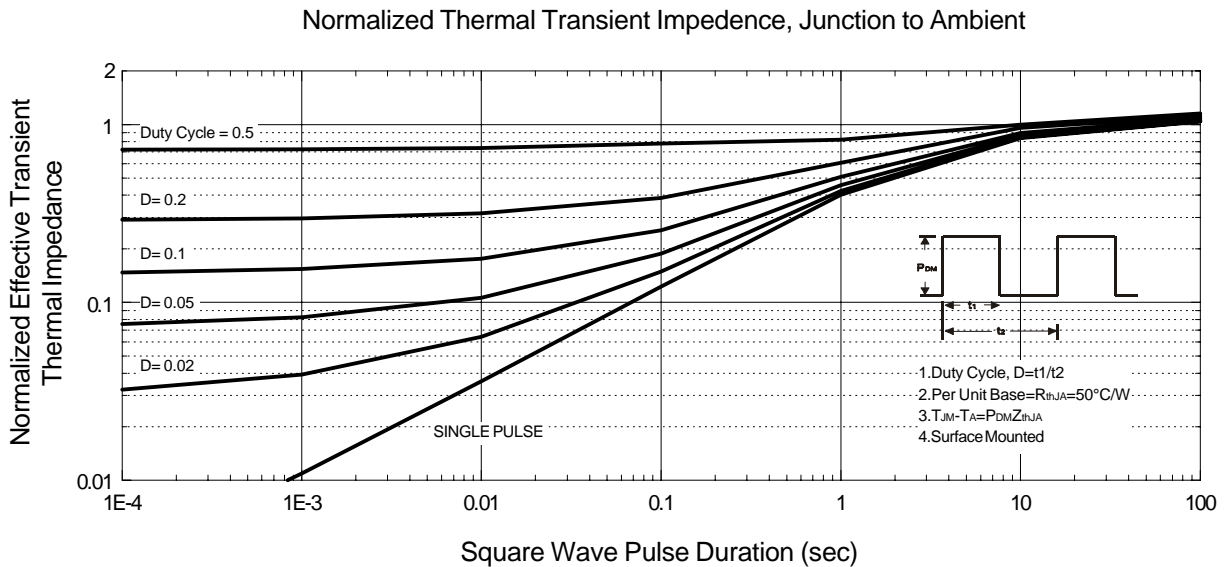
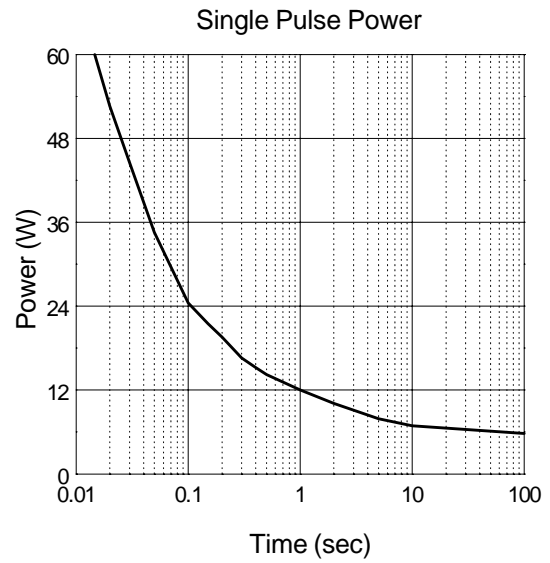
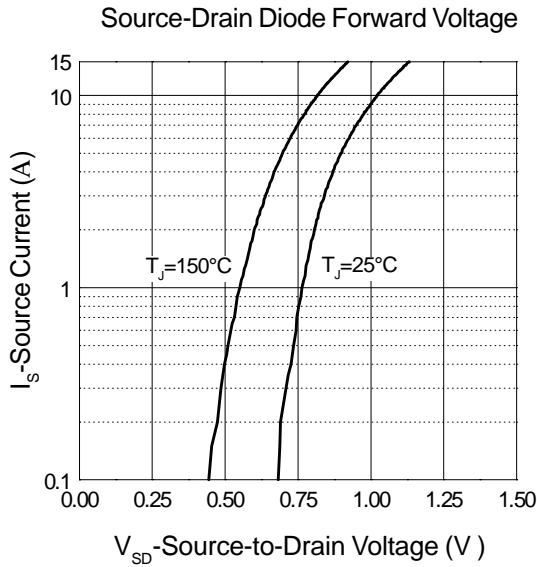
On-Resistance vs. Drain Current



Typical Characteristics (Cont.)

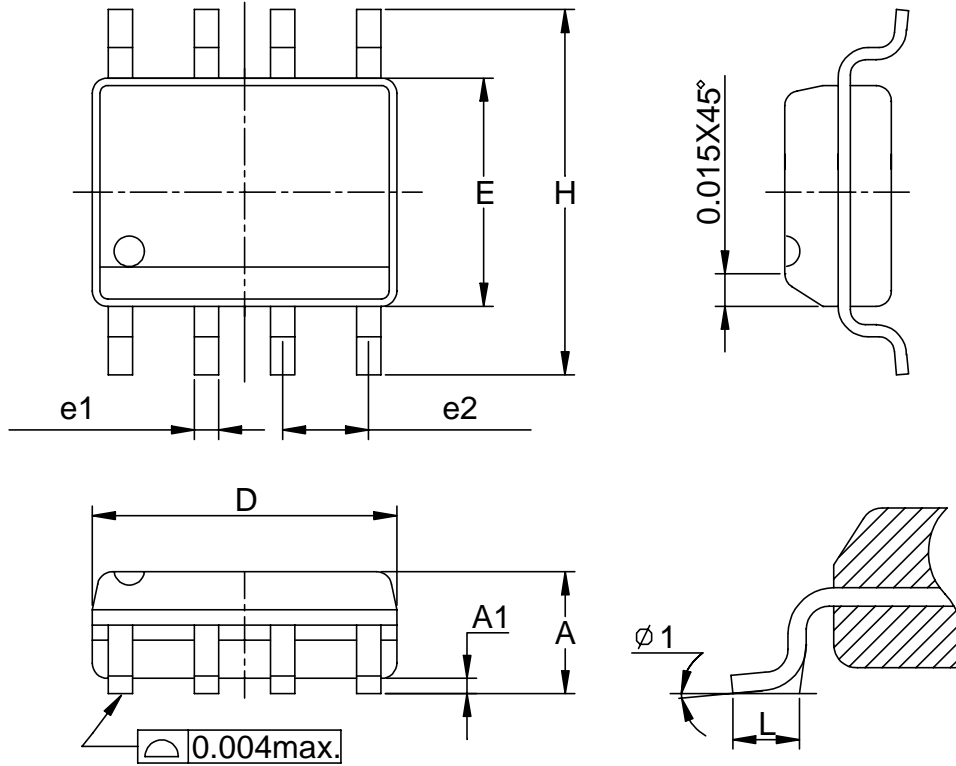


Typical Characteristics (Cont.)



## Packaging Information

SOP-8 pin ( Reference JEDEC Registration MS-012)

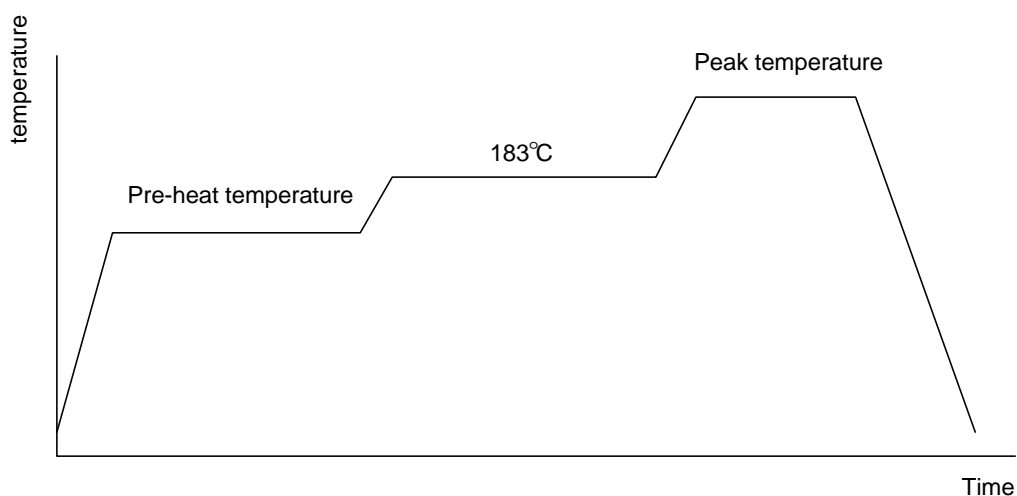


Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
D	4.80	5.00	0.189	0.197
E	3.80	4.00	0.150	0.157
H	5.80	6.20	0.228	0.244
L	0.40	1.27	0.016	0.050
e1	0.33	0.51	0.013	0.020
e2	1.27BSC		0.50BSC	
φ 1	8°		8°	

## Physical Specifications

Terminal Material	Solder-Plated Copper (Solder Material : 90/10 or 63/37 SnPb)
Lead Solderability	Meets EIA Specification RSI86-91, ANSI/J-STD-002 Category 3.

## Reflow Condition (IR/Convection or VPR Reflow)



## Classification Reflow Profiles

	Convection or IR/ Convection	VPR
Average ramp-up rate(183°C to Peak)	3°C/second max.	10 °C /second max.
Preheat temperature 125 ± 25°C)	120 seconds max	
Temperature maintained above 183°C	60 – 150 seconds	
Time within 5°C of actual peak temperature	10 –20 seconds	60 seconds
Peak temperature range	220 +5/-0°C or 235 +5/-0°C	215-219°C or 235 +5/-0°C
Ramp-down rate	6 °C /second max.	10 °C /second max.
Time 25°C to peak temperature	6 minutes max.	

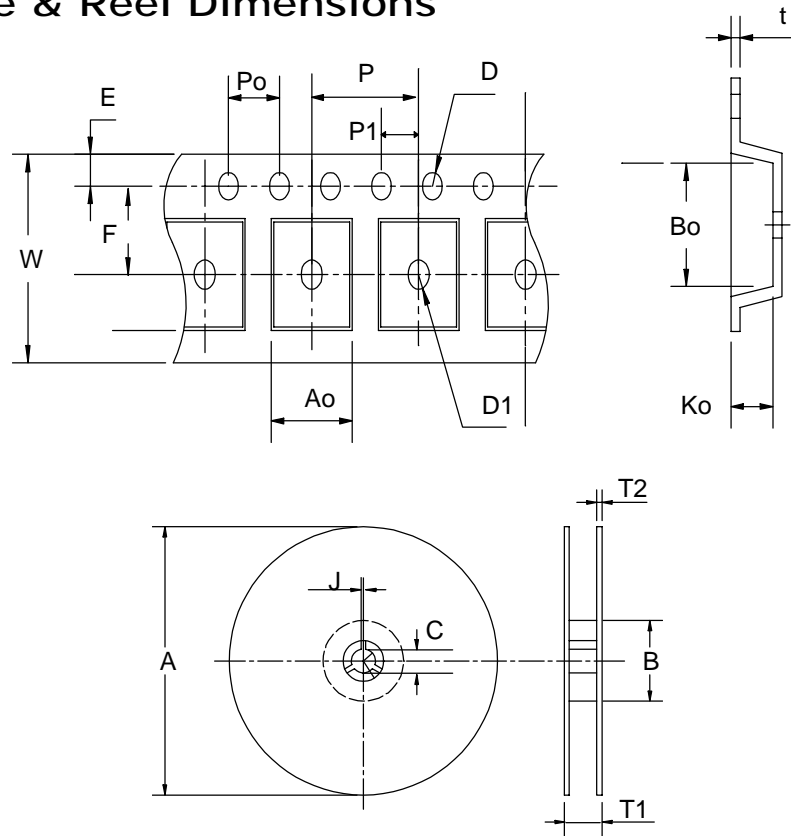
## Package Reflow Conditions

pkg. thickness ≥ 2.5mm and all bgas	pkg. thickness < 2.5mm and pkg. volume ≥ 350 mm <sup>3</sup>	pkg. thickness < 2.5mm and pkg. volume < 350mm <sup>3</sup>
Convection 220 +5/-0 °C		Convection 235 +5/-0 °C
VPR 215-219 °C		VPR 235 +5/-0 °C
IR/Convection 220 +5/-0 °C		IR/Convection 235 +5/-0 °C

## Reliability test program

Test item	Method	Description
SOLDERABILITY	MIL-STD-883D-2003	245°C, 5 SEC
HOLT	MIL-STD 883D-1005.7	1000 Hrs Bias @ 125°C
PCT	JESD-22-B, A102	168 Hrs, 100% RH, 121°C
TST	MIL-STD 883D-1011.9	-65°C ~ 150°C, 200 Cycles

## Carrier Tape & Reel Dimensions



Application	A	B	C	J	T1	T2	W	P	E
SOP- 8	330 ± 1	62 +1.5	12.75+ 0.15	2 ± 0.5	12.4 ± 0.2	2 ± 0.2	12± 0.3	8± 0.1	1.75±0.1
	F	D	D1	Po	P1	Ao	Bo	Ko	t
	5.5± 1	1.55 +0.1	1.55+ 0.25	4.0 ± 0.1	2.0 ± 0.1	6.4 ± 0.1	5.2± 0.1	2.1± 0.1	0.3±0.013



## Cover Tape Dimensions

Application	Carrier Width	Cover Tape Width	Devices Per Reel
SOP- 8	12	9.3	2500

## Customer Service

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