N-Channel Enhancement Mode MOSFET

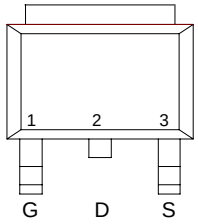
Features

- 25V/60A , $R_{DS(ON)}$=8mΩ(typ.) @ V_{GS}=10V
  $R_{DS(ON)}$=11mΩ(typ.) @ V_{GS}=4.5V
- Super High Dense Advanced Cell Design for Extremely Low $R_{DS(ON)}$
- Reliable and Rugged
- TO-252 Package

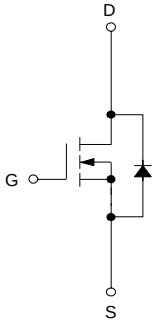
Applications

- Power Management in Desktop Computer or DC/DC Converters.

Pin Description



Top View of TO-252



N-Channel MOSFET

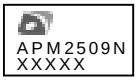
Ordering and Marking Information

APM2509N □□-□□□

- Lead Free Code
- Handling Code
- Temp. Range
- Package Code

Package Code
U : TO-252
Operating Junction Temp. Range
C : -55 to 150°C
Handling Code
TU : Tube
TR : Tape & Reel
Lead Free Code
L : Lead Free Device Blank : Original Device

APM2509N U :



XXXXX - Date Code

Absolute Maximum Ratings (T$_A$ = 25°C unless otherwise noted)

Symbol	Parameter	Rating	Unit
V_{DSS}	Drain-Source Voltage	25	V
V_{GSS}	Gate-Source Voltage	±20	
I_D*	Maximum Drain Current – Continuous	60	A
I_{DM}	Maximum Drain Current – Pulsed	110	

* Surface Mounted on FR4 Board, t ≤ 10 sec.

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 (Cont.) (T_A = 25°C unless otherwise noted)

Symbol	Parameter		Rating	Unit
P_D	Maximum Power Dissipation	T_C=25°C	50	W
		T_C=100°C	20	
T_J,T_{STG}	Maximum Operating and Storage Junction Temperature		-55 to 150	°C
$R_{\theta JA}$*	Thermal Resistance – Junction to Ambient		50	°C/W
$R_{\theta JC}$	Thermal Resistance – Junction to Case		2.5	°C/W

Electrical Characteristics (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	APM2509N			Unit
			Min.	Typ.	Max.	
Static						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250μA	25			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=20V , V_{GS}=0V			1	μA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	1	1.5	2	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V			±100	nA
$R_{DS(ON)}$[a]	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=35A		8	9	mΩ
		V_{GS}=4.5V, I_{DS}=20A		11	15	
V_{SD}[a]	Diode Forward Voltage	I_S=35A, V_{GS}=0V		0.85	1.3	V
Dynamic[b]						
Q_g	Total Gate Charge	V_{DS}=15V, I_{DS}=30A		20.2	28	nC
Q_{gs}	Gate-Source Charge	V_{GS}=4.5V,		4.8		
Q_{gd}	Gate-Drain Charge			8.4		
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=15V, I_{DS}=1A, V_{GEN}=10V, R_G= 6Ω		10	15	ns
T_r	Turn-on Rise Time			7	13	
$t_{d(OFF)}$	Turn-off Delay Time			35	50	
T_f	Turn-off Fall Time			10	20	
C_{iss}	Input Capacitance	V_{GS}=0V		1785		pF
C_{oss}	Output Capacitance	V_{DS}=15V		605		
C_{rss}	Reverse Transfer Capacitance	Frequency =1.0MHz		490		

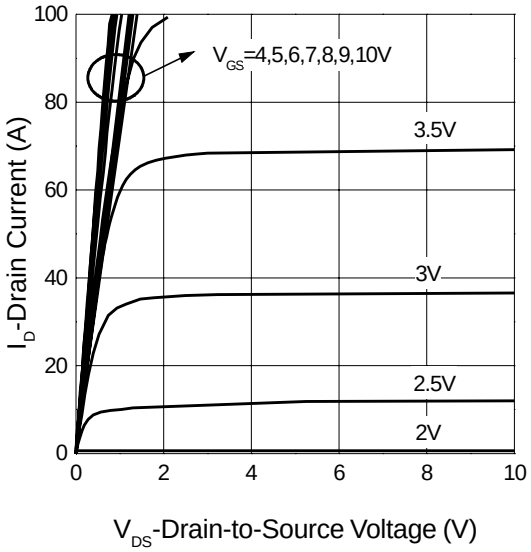
Notes

[a] : Pulse test ; pulse width ≤300μs, duty cycle ≤ 2%

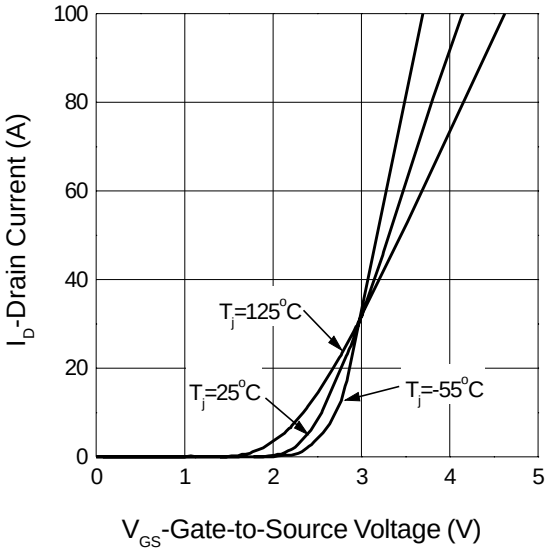
[b] : Guaranteed by design, not subject to production testing

Typical Characteristics

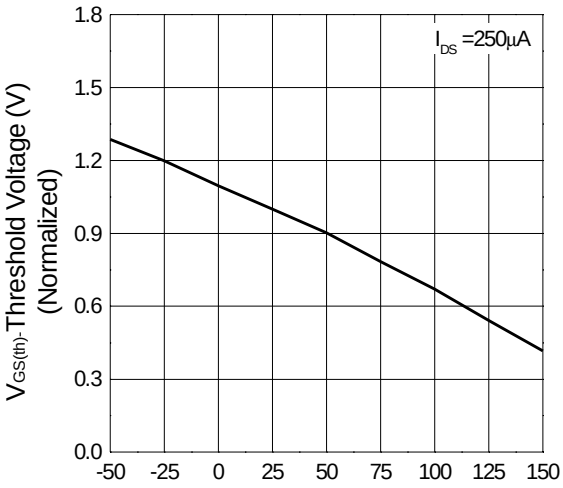
Output Characteristics



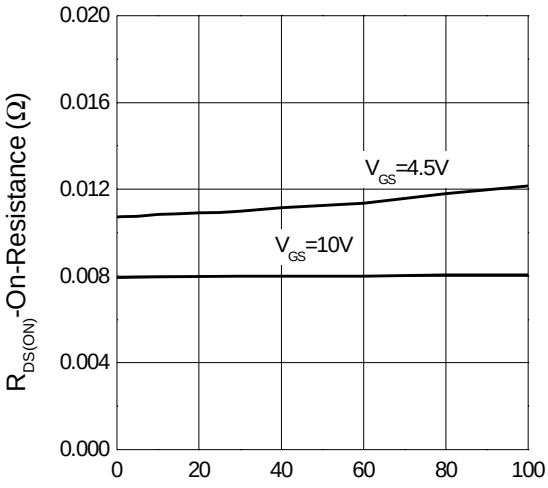
Transfer Characteristics



Threshold Voltage vs. Junction Temperature

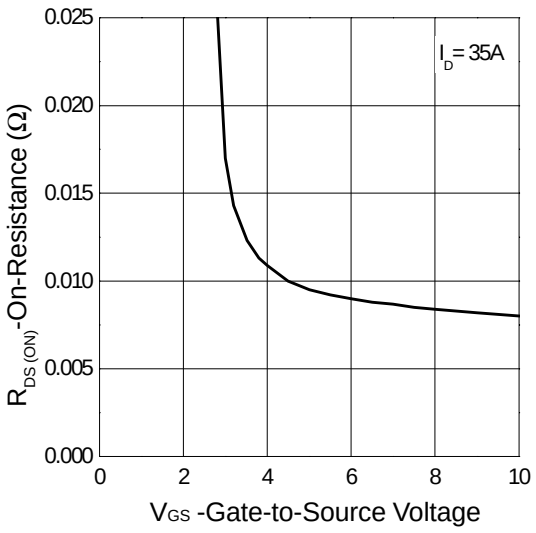


On-Resistance vs. Drain Current

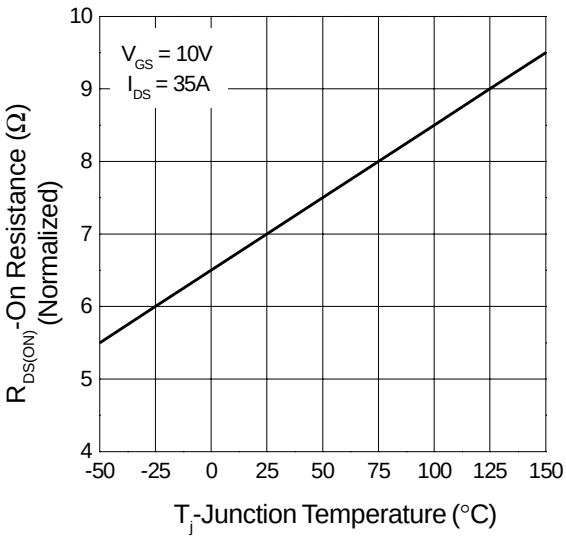


Typical Characteristics (Cont.)

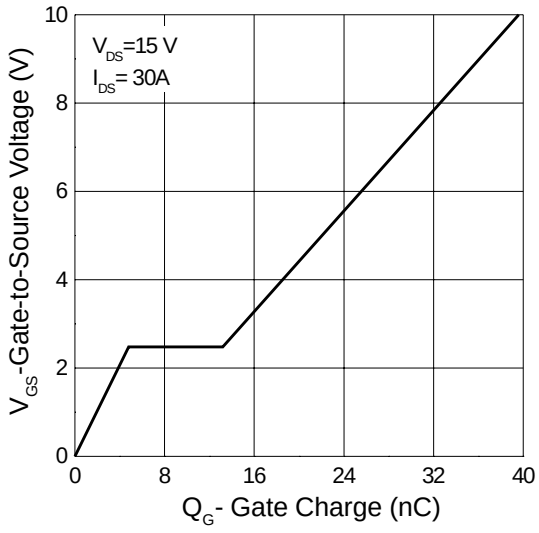
On-Resistance vs. Gate-to-Source Voltage



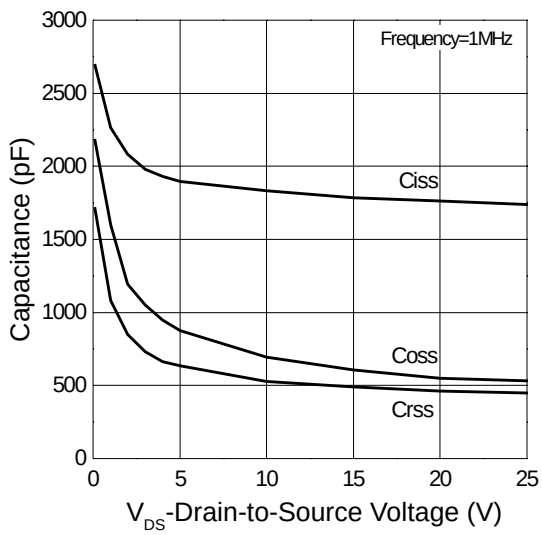
On-Resistaence vs. Junction Temperature



Gate Charge

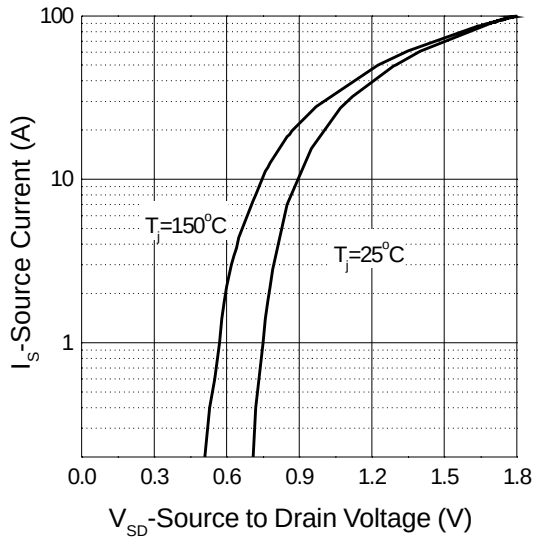


Capacitance

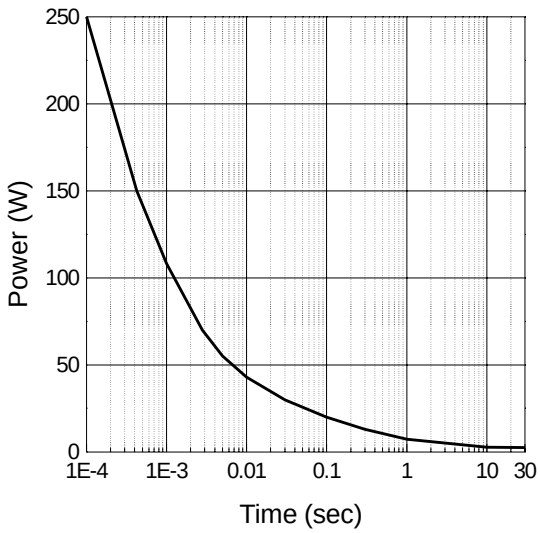


Typical Characteristics (Cont.)

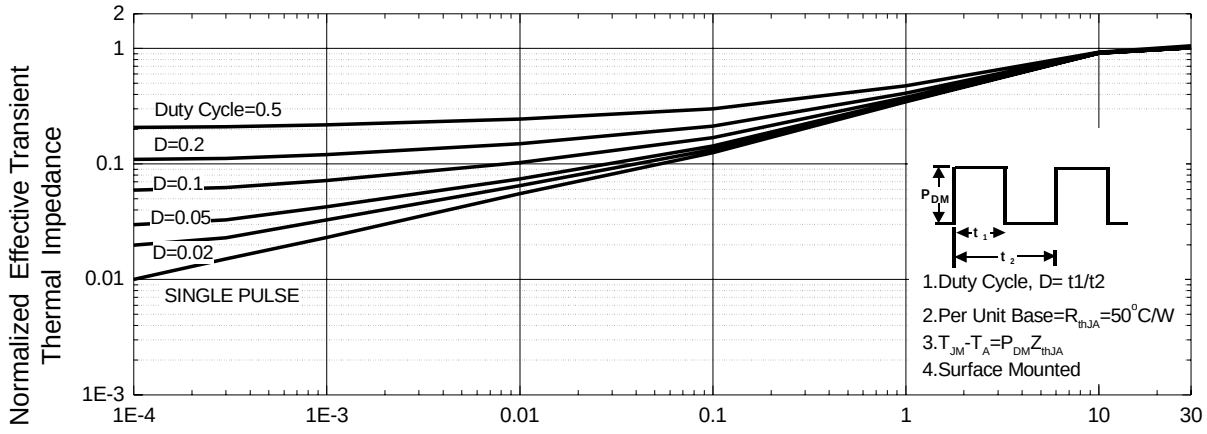
Source-Drain Diode Forward Voltage



Single Pulse Power

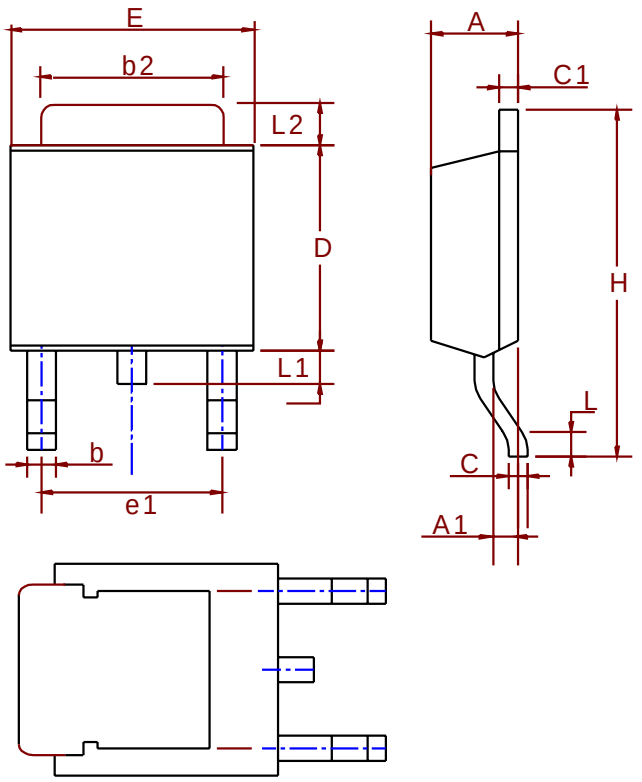


Normalized Thermal Transient Impedence, Junction to Ambient



Package Informaion

TO-252(Reference JEDEC Registration TO-252)

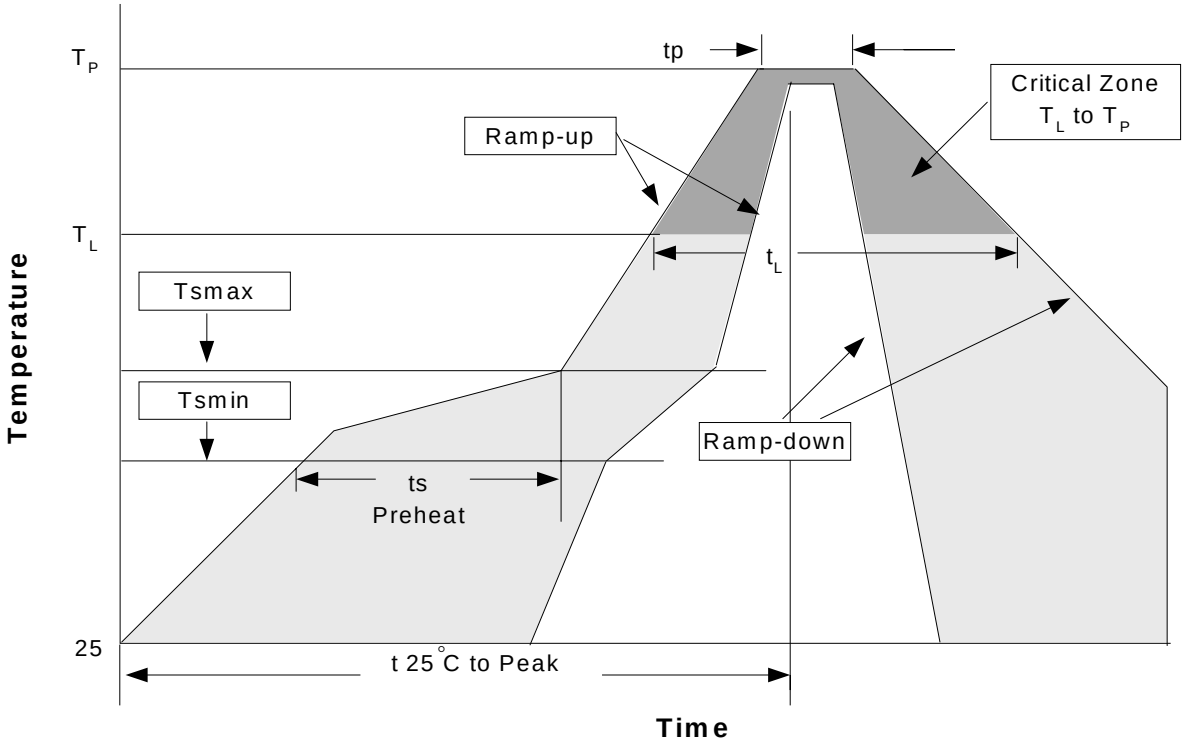


Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.18	2.39	0.086	0.094
A1	0.89	1.27	0.035	0.050
b	0.508	0.89	0.020	0.035
b2	5.207	5.461	0.205	0.215
C	0.46	0.58	0.018	0.023
C1	0.46	0.58	0.018	0.023
D	5.334	6.22	0.210	0.245
E	6.35	6.73	0.250	0.265
e1	3.96	5.18	0.156	0.204
H	9.398	10.41	0.370	0.410
L	0.51		0.020	
L1	0.64	1.02	0.025	0.040
L2	0.89	2.032	0.035	0.080

Physical Specifications

Terminal Material	Solder-Plated Copper (Solder Material : 90/10 or 63/37 SnPb), 100%Sn
Lead Solderability	Meets EIA Specification RSI86-91, ANSI/J-STD-002 Category 3.

Reflow Condition (IR/Convection or VPR Reflow)



Classificatin Reflow Profiles

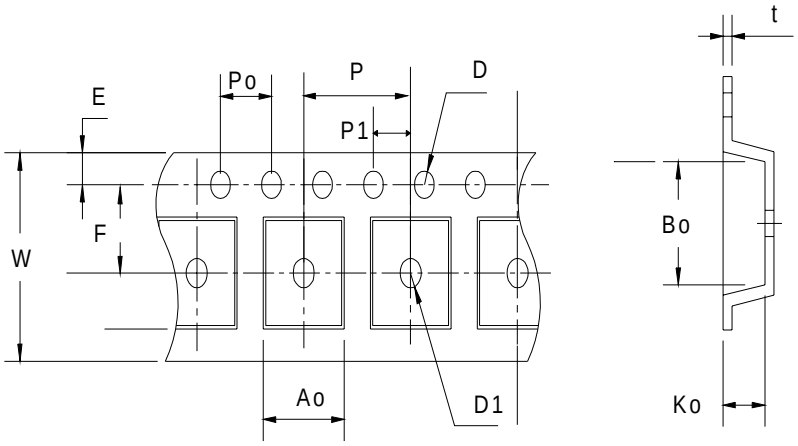
Profile Feature	Sn-Pb Eutectic Assembly		Pb-Free Assembly	
	Large Body	Small Body	Large Body	Small Body
Average ramp-up rate (T_L to T_P)	3°C/second max.		3°C/second max.	
Preheat - Temperature Min (Tsmin) - Temperature Mix (Tsmax) - Time (min to max)(ts)	100°C 150°C 60-120 seconds		150°C 200°C 60-180 seconds	
Tsmax to T_L - Ramp-up Rate			3°C/second max	
Tsmax to T_L - Temperature(T_L) - Time (t_L)	183°C 60-150 seconds		217°C 60-150 seconds	
Peak Temperature(Tp)	225 +0/-5°C	240 +0/-5°C	245 +0/-5°C	250 +0/-5°C
Time within 5°C of actual Peak Temperature(tp)	10-30 seconds	10-30 seconds	10-30 seconds	20-40 seconds
Ramp-down Rate	6°C/second max.		6°C/second max.	
Time 25°C to Peak Temperature	6 minutes max.		8 minutes max.	

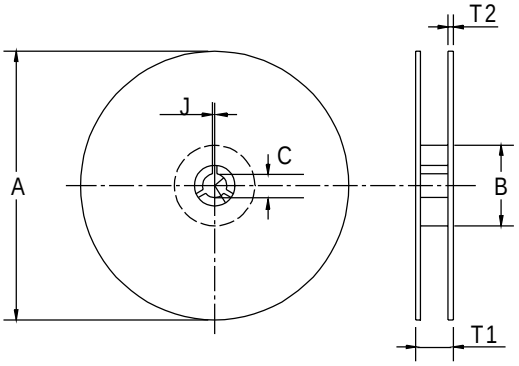
Note: All temperatures refer to topside of the package. Measured on the body surface.

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 Dimension





Application	A	B	C	J	T1	T2	W	P	E
TO-252	330 ±3	100 ± 2	13 ± 0. 5	2 ± 0.5	16.4 + 0.3 -0.2	2.5± 0.5	16+ 0.3 - 0.1	8 ± 0.1	1.75± 0.1
	F	D	D1	Po	P1	Ao	Bo	Ko	t
	7.5 ± 0.1	1.5 +0.1	1.5± 0.25	4.0 ± 0.1	2.0 ± 0.1	6.8 ± 0.1	10.4± 0.1	2.5± 0.1	0.3±0.05

(mm)

Cover Tape Dimensions

Application	Carrier Width	Cover Tape Width	Devices Per Reel
TO- 252	16	13.3	2500

Customer Service

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