1.0A LOW-DROPOUT LINEAR REGULATORS

FEATURES

- **Output Voltage: 3.3V**
- **Dropout Voltage of 1.2V at 0.8A**
- **Line Regulation: 0.3mV at I_{OUT} = 10mA**
- **Load Regulation: 4mV at I_{OUT} = 0mA to 800mA**
- **Quiescent Current: 4.0mA**
- **Output Short Current: 1.6A**
- **PSRR 80dB at 120Hz**
- **Output Noise from 10Hz to 100kHz: 100μVrms**
- **Thermal Shutdown Protection**
- **Operation Junction Temperature: -40℃ to +125℃**
- **These are Pb-Free Devices**

APPLICATIONS

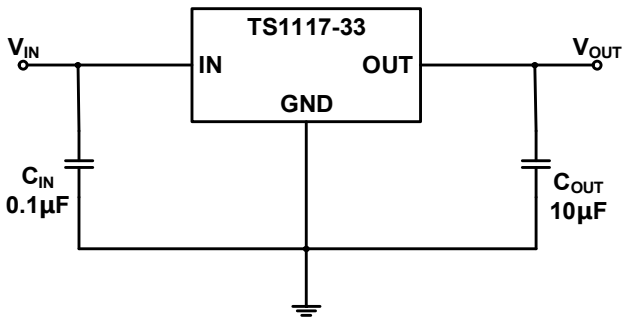
- **Consumer and Industrial Equipment Point of Regulation**
- **Switching Power Supply Post Regulation**
- **TVs and LCD Monitors**
- **Appliances and White Goods**

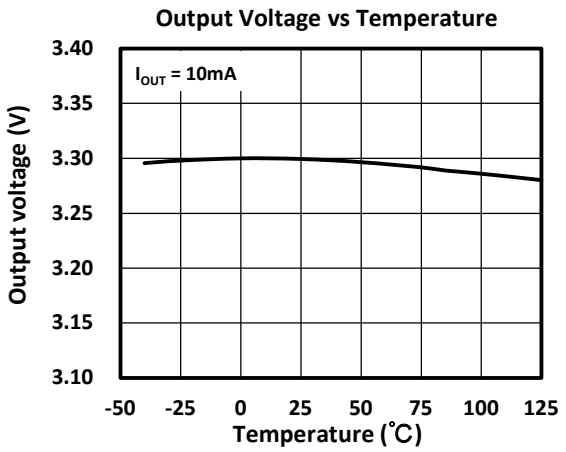
PRODUCT DESCRIPTION

The TS1117-33 is a low dropout three-terminal regulator with 1.0A output current, and the dropout voltage is specified at typical 1.2V at 0.8A current load and decrease at lower load currents.

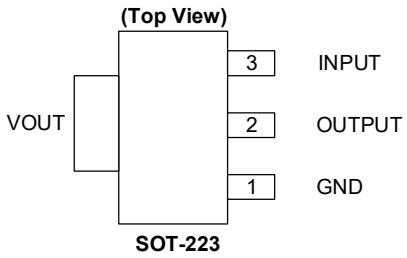
The TS1117-33 has been optimized for low voltage where transient response and minimum input voltage are critical. Its circuit includes a trimmed band gap reference to assure output voltage accuracy to be within ±1%. It provides current limit and thermal shutdown protection solutions. On-chip thermal shutdown provides protection against a combination of high current and ambient temperature that would create excessive junction temperature.

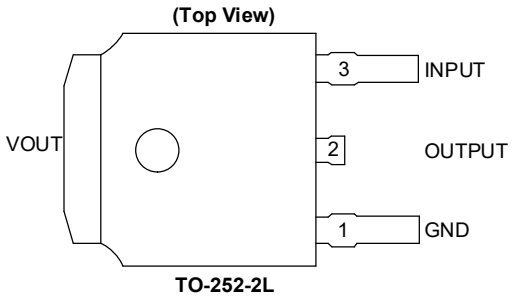
The TS1117-33 is available in the industry-standard SOT-223 and TO-252-2L packages.





PIN CONFIGURATION AND FUNCTIONS





TERMINAL		I/O	DESCRIPTION
NAME	NO.		
GND	1	I	Ground
OUT	2	O	Regulated Output Voltage
IN	3	I	Input Voltage

ORDERING INFORMATION

Model	Part Number	Eco Plan	Package	Output Voltage (V)	Container, Pack Qty
TS1117-33	TS111733SOT223R	RoHS	SOT-223	3.3	Reel, 2500
TS1117-33	TS111733TO2522LR	RoHS	TO-252-2L	3.3	Reel, 2500

RECOMMENDED OPERATING CONDITIONS

Parameter	Min	TYP	Max	Unit
Input Voltage, V_{IN}			15	V
Output Current, I_{OUT} (1)	0		1(2)	A

(1) Continuous current and operating junction temperature are limited by internal protection circuitry, but it is not recommended that the device operate under conditions beyond those specified in this table for extended periods of time. The continuous current needs to ensure that the dissipation power of the chip does not exceed the maximum dissipation power.
(2) Chip is soldered to about 300mm^2 copper (top side solder mask) on 1oz.1 layers FR-4 PCB.

ABSOLUTE MAXIMUM RATINGS

Over operating free-air temperature range (unless otherwise noted) (3)

Parameter		Min	Typ	Max	Unit
Input Voltage Range		-0.3		18	V
Peak Output Current		Internally Limited			
Maximum power dissipation(4)			0.8		W
Junction Temperature		-40		150	˚C
Storage Temperature Range		-65		150	˚C
Junction To Ambient Thermal Resistance (Without Heatsink)(5)	SOT-223		125		˚C/W
	TO-252-2L		100		˚C/W
ESD HBM			±2000		V
ESD MM			±200		V

(3) Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.
(4) The maximum dissipation power is related to T_J (max), θ_{JA} and T_A. The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J (max) – T_A) / \theta_{JA}$. The data in the table is measured at room temperature using SOT223 packaged chips. It should be noted that the heat dissipation conditions of the chip are controlled under relatively poor conditions.
(5) The chip is soldered on a PCB with a certain heat dissipation effect but no heat sink.

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjects to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

ELECTRICAL CHARACTERISTICS

Boldface limits apply over the specified Junction temperature range, **T_A = −40˚C to +125˚C.**

At T_A = +25˚C, V_{IN} = V_{OUT} (typ) + 1.5V, I_{OUT} = 10mA,C_{IN} = 0.1μF,C_{OUT} = 10μF (unless otherwise noted) [6]

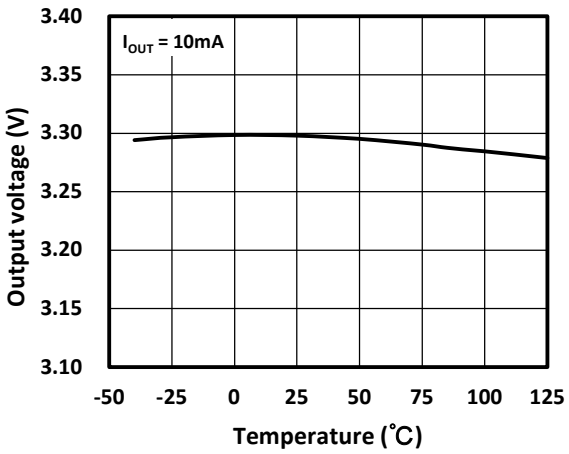
Parameter		Operating Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	V_{OUT} + 1.5V ≤ V_{IN} ≤ 15V	3.267	3.3	3.333	V
			3.235	**3.3**	**3.365**	**V**
V_{RLINE}	Line Regulation	1.5V ≤ V_{IN} - V_{OUT} ≤ 10V , I_{OUT} = 10mA		0.3	3	mV
					6	**mV**
V_{RLOAD}	Load Regulation	0mA ≤ I_{OUT} ≤ 800mA		4	8	mV
					15	**mV**
I_Q	Quiescent Current	I_{OUT} = 0mA		4	6	mA
					10	**mA**
I_{short}	Short Current	1.5V ≤ V_{IN} - V_{OUT} , Vout = 0V	1	1.6		A
V_{DROP}	Dropout Voltage	I_{OUT} = 100mA		0.95		V
					1.05	**V**
		I_{OUT} = 500mA		1.1		V
					1.2	**V**
		I_{OUT} = 800mA		1.2		V
					1.4	**V**
V_{NOISE}	Output Noise Voltage	BW = 10Hz to 100kHz		100		μVrms
$V_{OUTDRIFT}$	Output Voltage Temperature Coefficient			0.5		%
PSRR	Power Supply Rejection Ratio	V_{ripple} = 0.1V_{PP} , f = 120Hz V_{IN} = 6.3V		80		dB
T_{OTSD}	Thermal Shutdown Temperature			+160		˚C
T_{HYOTSD}	Thermal Shutdown Hysteresis Temperature			+16		˚C
θ_{JC}	Thermal Resistance (Junction to Case)	SOT-223		15		˚C/W
		TO-252-2L		10		

(6) Test time of each parameter is within 5ms. Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible.

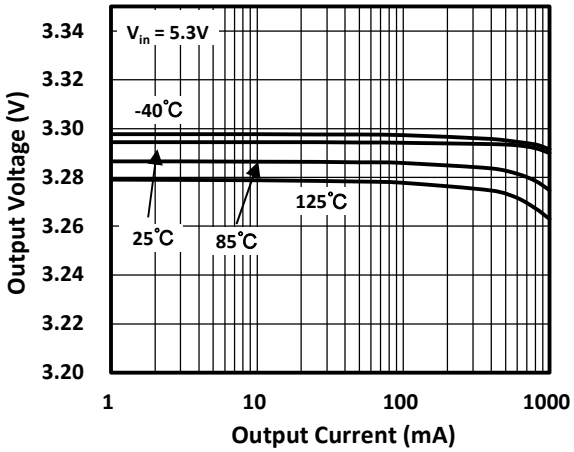
TYPICAL CHARACTERISTICS

At T_A = +25°C, V_{IN} = V_{OUT} (typ) + 1.5 V, I_{OUT} = 10mA, C_{IN} = 0.1µF, C_{OUT} = 10µF (unless otherwise noted) [6]

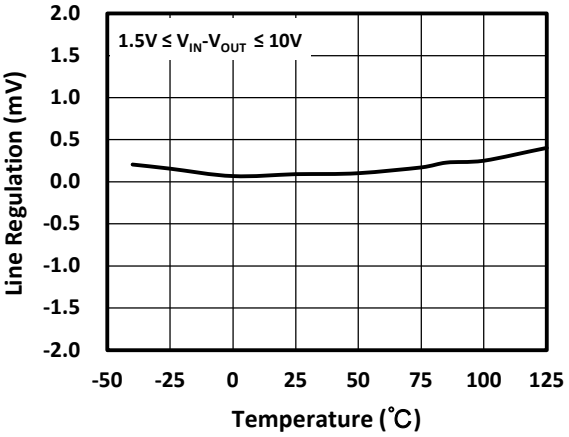
Output Voltage vs Temperature



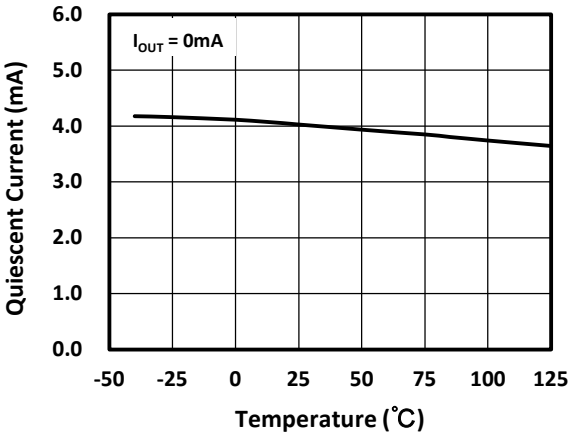
Output Voltage vs Output Current



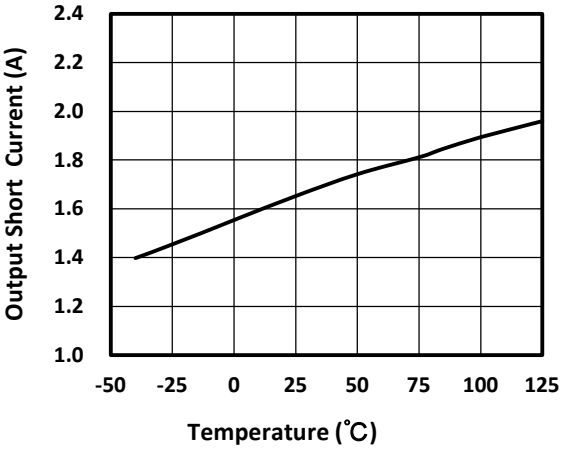
Line Regulation vs Temperature



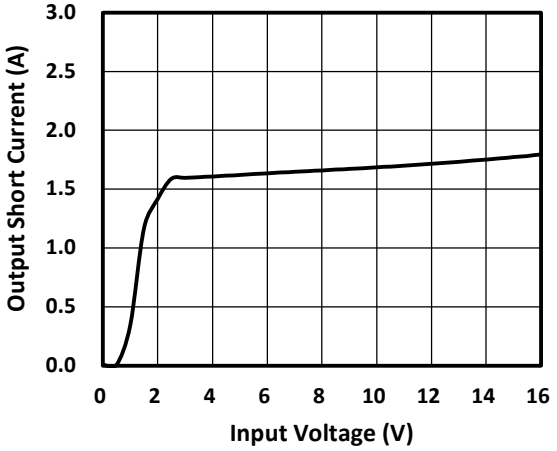
Quiescent Current vs Temperature



Output Short Current vs Temperature



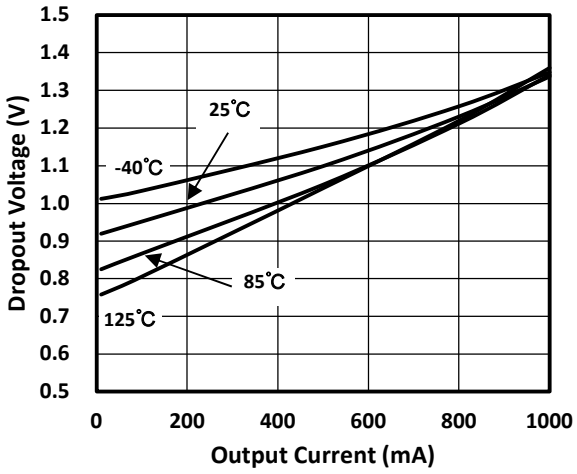
Output Short Current vs Input Voltage



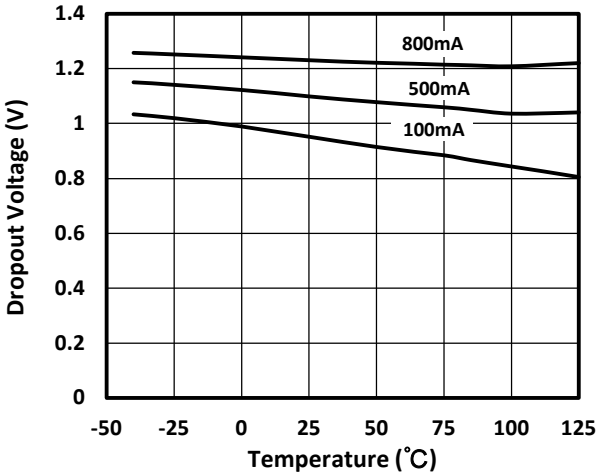
TYPICAL CHARACTERISTICS (CONTINUED)

At T_A = +25°C, V_{IN} = V_{OUT} (typ) + 1.5 V, I_{OUT} = 10mA, C_{IN} = 0.1μF, C_{OUT} = 10μF (unless otherwise noted) (6)

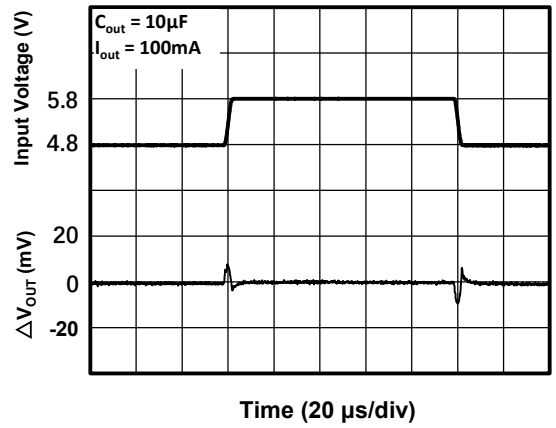
Dropout Voltage vs Output Current



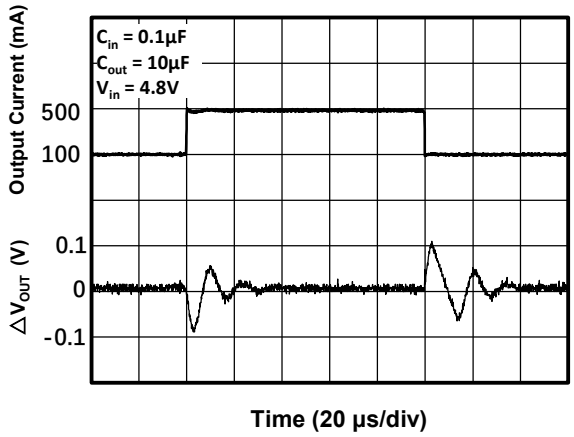
Dropout Voltage vs Temperature



Line Transient Response

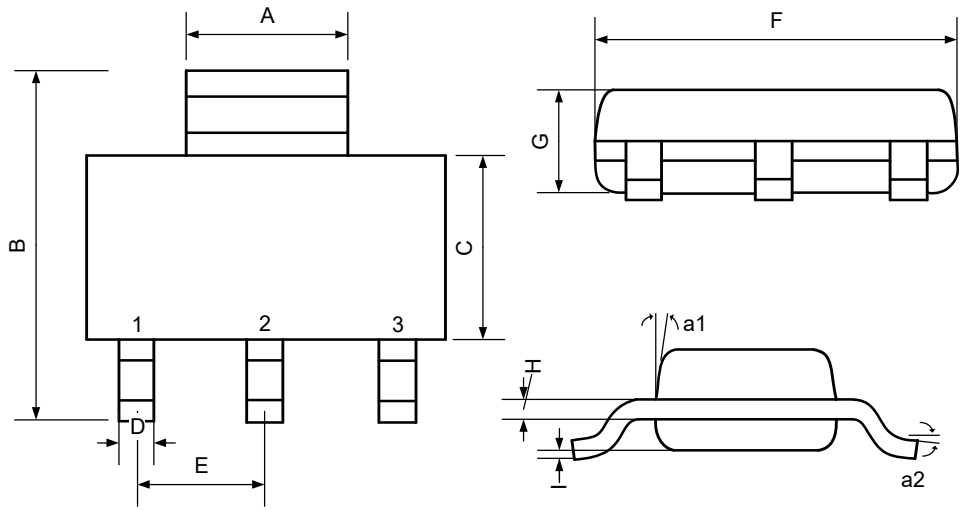


Load Transient



MECHANICAL DIMENSIONS

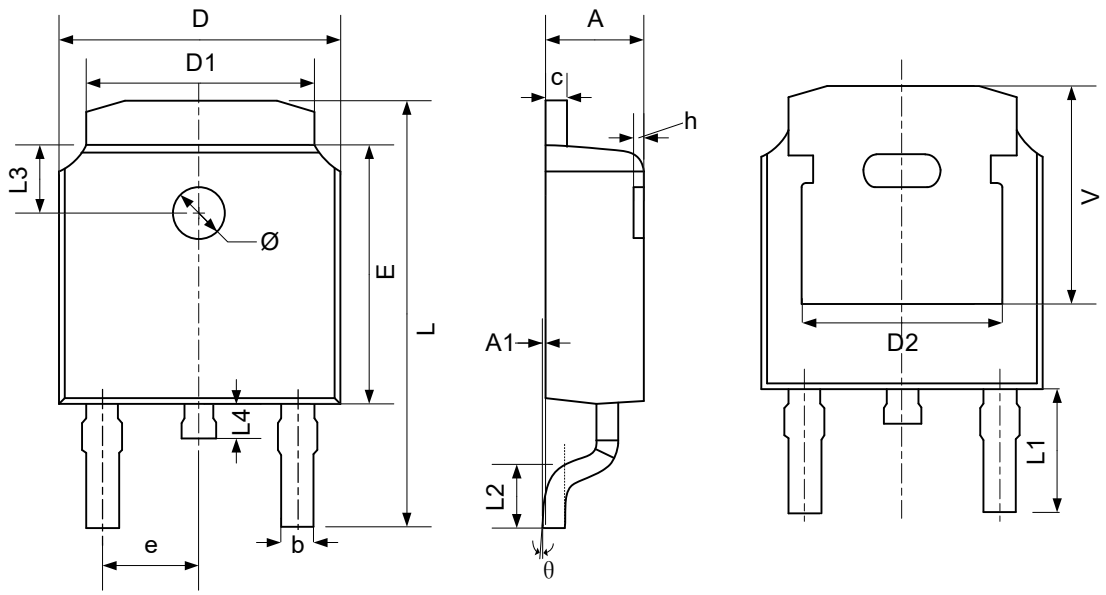
SOT-223 PACKAGE MECHANICAL DRAWING



SOT-223 PACKAGE MECHANICAL DATA

symbol	dimensions			
	millimeters		inches	
	min	max	min	max
A	2.9	3.1	0.1142	0.1220
B	6.70	7.30	0.2638	0.2874
C	3.30	3.70	0.1299	0.1457
D	0.60	0.80	0.0236	0.0315
E	2.3		0.0906	
F	6.30	6.70	0.2480	0.2638
G	1.40	1.80	0.0551	0.0709
H	0.23	0.35	0.0098	0.0138
I	0.02	0.10	0.0008	0.0039
a1	13°			
a2	0°	10°	0°	10°

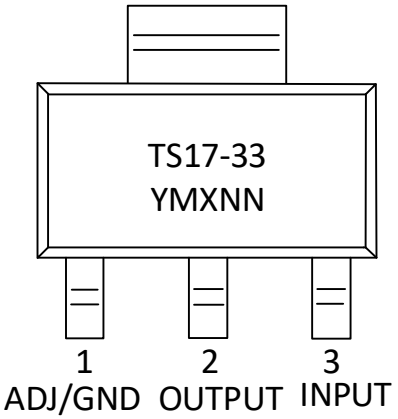
TO-252-2L PACKAGE MECHANICAL DRAWING



TO-252-2L PACKAGE MECHANICAL DATA

symbol	dimensions			
	millimeters		inches	
	min	max	min	max
A	2.200	2.400	0.087	0.094
A1	0	0.127	0	0.005
b	0.635	0.770	0.025	0.030
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830		0.190	
E	6.000	6.200	0.236	
e	2.186	2.386	0.086	0.094
L	9.712	10.312	0.382	0.406
L1	2.900		0.114	
L2	1.400	1.700	0.055	0.067
L3	1.600		0.063	
L4	0.600	1.000	0.024	0.039
ϕ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0	0.300	0	0.012
V	5.250		0.207	

PACKAGING MARKING INFORMATION

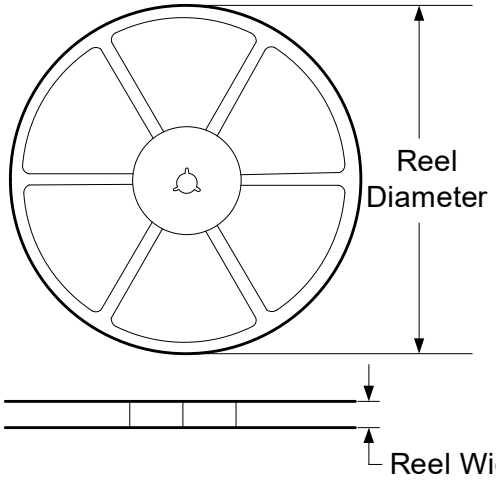


Legend	**TS17-33**	**Product Name**
	Y	**Year Code**
	M	**Monthly Code**
	X	**Factory Code**
	NN	**Batch Number**

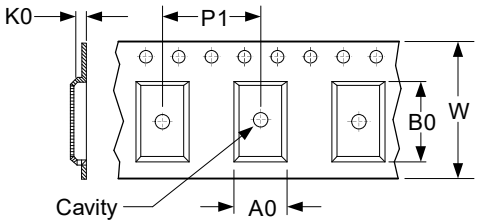
Year Code	A	B	C	D	E	F	G	H	I	J	K	L
Y	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Monthly Code	A	B	C	D	E	F	G	H	I	J	K	L
M	1 月	2 月	3 月	4 月	5 月	6 月	7 月	8 月	9 月	10 月	11 月	12 月

TAPE AND REEL INFORMATION

REEL DIMENSIONS

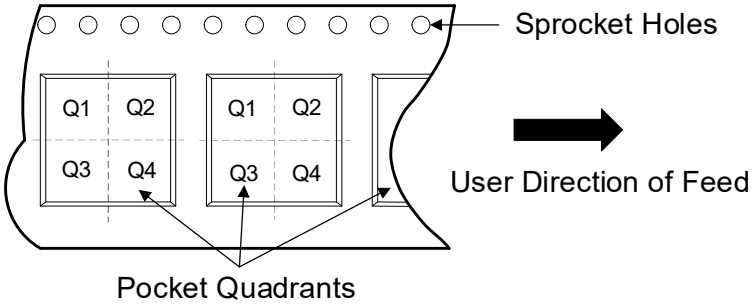


TAPE DIMENSIONS



A0	Dimensioon designed to accommodate the component width
B0	Dimensioon designed to accommodate the component length
K0	Dimensioon designed to accommodate the component width thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



Device	Package Type	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TS111733SOT223R	SOT-223	4	2500	180.000	9.000	6.765	7.335	1.880	8.000	12.000	Q3
TS111733TO2522LR	TO-252-2L	4	2500	330.000	16.400	6.900	10.500	2.700	8.000	16.000	Q2

REVISION HISTORY

NOTE: Page numbers for previous revisions may be different from that of the current version.

2020/10/23 — REV KY1.0.0A to REV KY1.1.0A
Updated TYPICAL CHARACTERISTICS……..……..6

2021/01/20 — REV KY1.1.0A to REV KY1.2.0A
Improve the test conditions and add some parameters……..……..1-6

2021/01/25 — REV KY1.2.0A to REV KY1.3.0A
Updated ELECTRICAL CHARACTERISTICS test conditions ……..……..1-6

2021/06/22 — REV KY1.3.0A to REV KY1.4.0A
Updated SOT223 SPQ……..……..2,9

2022/6/24 – REV KY1.4.0A to REV KY1.4.1A
Add PACKAGING MARKING INFORMATION……..……..…… ……9

2022/12/12 – REV KY1.5.1A to REV KY1.5.1A
Updated the schematic on the front page……..……..…… ……1

CONTACT INFORMATION

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