

# MT3453

## N-Channel 150V Switch MOSFET

### Features

- Typ  $R_{DS(on)}=0.27\Omega$  @  $V_{GS}=10V, I_D=2A$
- Fast Switching Speed
- Low Gate Charge
- High Power and Current Handling Capability
- ESD Rating:2000V HBM

### General Description

This N-Channel MOSFET is produced using MOS-TECH Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet

### Applications

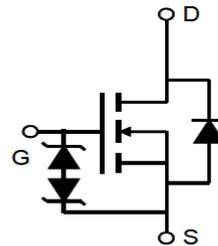
- DC Switch
- Led Driver



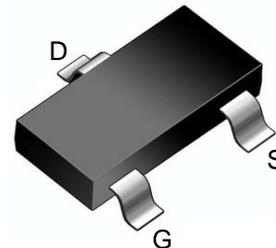
**MT Semiconductor®**

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### Simplified Schematic



### MARKING DIAGRAM & PIN ASSIGNMENT



### MOSFET Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Ratings	Units	
$V_{DSS}$	Drain to Source Voltage	150	V	
$V_{GSS}$	Gate to Source Voltage	$\pm 20$	V	
$I_D$	Drain Current - Continuous (Silicon Limited) $T_C = 25^\circ\text{C}$	2.0	A	
	- Continuous (Package Limited) $T_C = 25^\circ\text{C}$	3.0		
	- Continuous $T_C = 25^\circ$	8.0		
	- Pulsed	4	A	
$E_{AS}$	Single Pulsed Avalanche Energy (Note 3)	1.0	mJ	
$P_D$	Power Dissipation	- $T_C = 25^\circ\text{C}$ (Note 1a)	2.4	W
		- $T_A = 25^\circ\text{C}$ (Note 1b)	0.2	W/ $^\circ\text{C}$
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +155	$^\circ\text{C}$	

### Thermal Characteristics

Symbol	Parameter	Ratings	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case (Note 1)	5.0	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	52	

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
MT3453	MT3453	SOT-23	-	-	3000

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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**Off Characteristics**

$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	150	--	--	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$	--	0.09	--	$V/^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=200\text{V}, V_{GS} = 0\text{ V}$	--	--	1	$\mu\text{A}$
		$V_{DS} = 80\text{ V}, T_C = 125^\circ\text{C}$	--	--	10	$\mu\text{A}$
$I_{GSSF}$	Gate-Body Leakage Current, Forward	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
$I_{GSSR}$	Gate-Body Leakage Current, Reverse	$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

**On Characteristics**

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	1	1.5	3.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_D=1\text{A}$	--	0.22	0.27	$\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=5\text{V}, I_D = 2\text{A}$ (Note 4)	--	4.5	--	S

**Dynamic Characteristics**

= 1 A

$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	--	1500	pF
$C_{oss}$	Output Capacitance		--	--	200	pF
$C_{rss}$	Reverse Transfer Capacitance		--	--	160	pF

**Switching Characteristics**

$t_{d(on)}$	Turn-On Delay Time	$V_{GS} = 10\text{V}, V_{DS} = 75\text{V}$ $R_L = 25\ \Omega, R_{GEN} = 6\ \Omega$	--	9	--	ns	
$t_r$	Turn-On Rise Time		--	11	--	ns	
$t_{d(off)}$	Turn-Off Delay Time		--	24	--	ns	
$t_f$	Turn-Off Fall Time		--	8	--	ns	
$Q_g$	Total Gate Charge		$V_{GS}=10\text{V}, V_{DS}=75\text{V}, I_D=3\text{A}$	--	16	--	nC
$Q_{gs}$	Gate-Source Charge			--	2.1	--	nC
$Q_{gd}$	Gate-Drain Charge	--		6.4	--	nC	

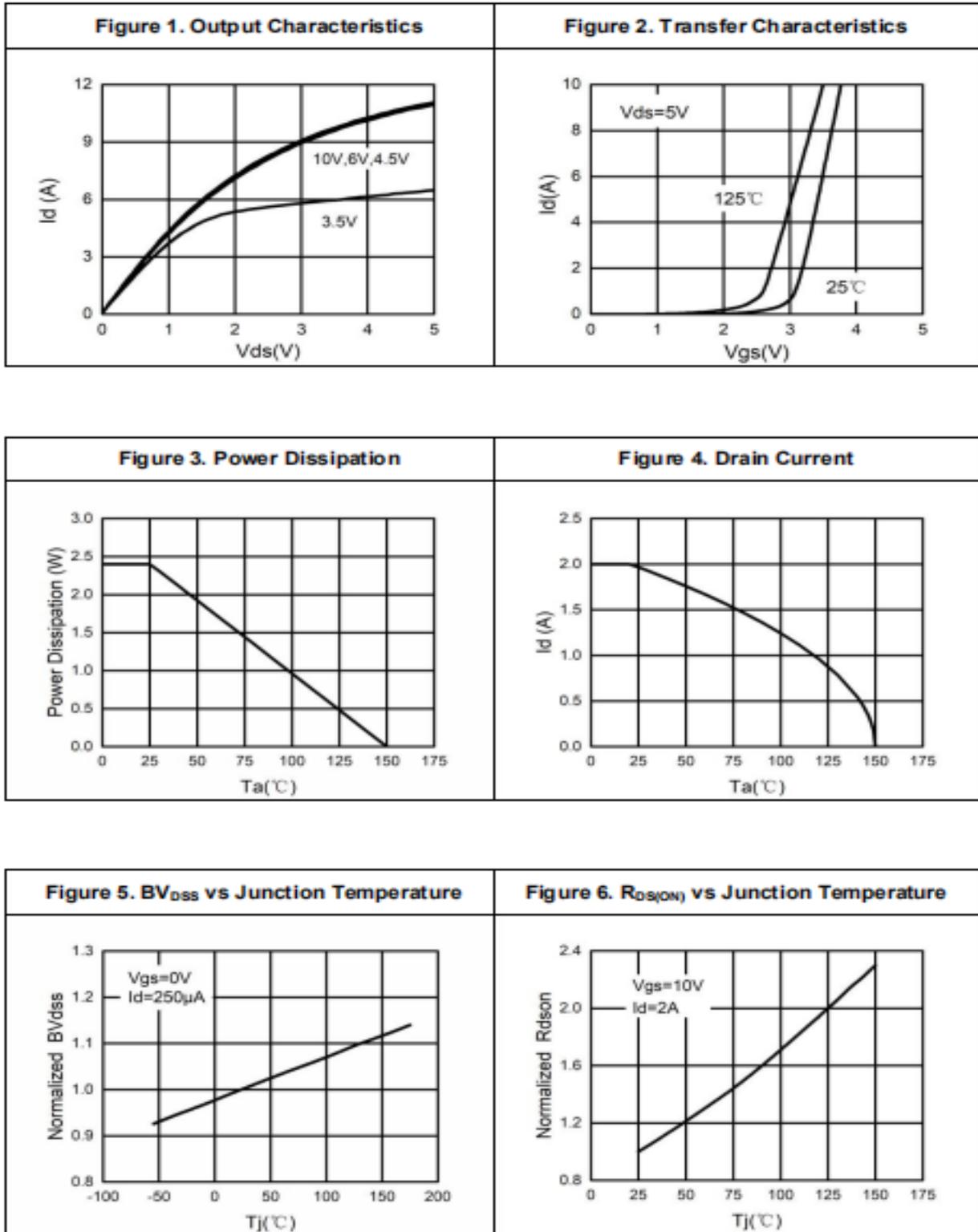
**Drain-Source Diode Characteristics and Maximum Ratings**

$I_S$	Maximum Continuous Drain-Source Diode Forward Current	--	--	2	A	
$I_{SM}$	Maximum Pulsed Drain-Source Diode Forward Current	--	--	2	A	
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{DS}=0\text{V}, I_S=2\text{A}$	--	--	1.2	V
$t_{rr}$	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 2\text{A}$	--	80	--	ns
$Q_{rr}$	Reverse Recovery Charge	$di_F / dt = 100\text{ A}/\mu\text{s}$ (Note 4)	--	0.195	--	$\mu\text{C}$

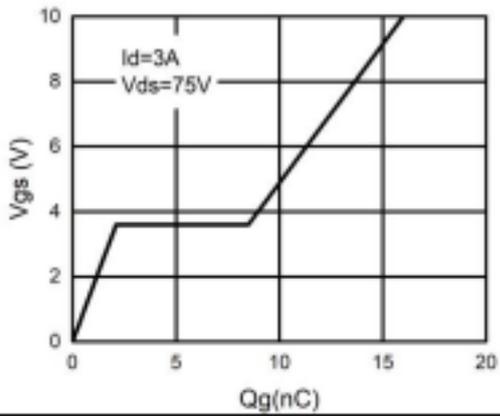
**Notes:**

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2.  $L = 1.35\text{mH}, I_{AS} = 15.6\text{A}, V_{DD} = 25\text{V}, R_G = 25\ \Omega$ , Starting  $T_J = 25^\circ\text{C}$
3.  $I_{SD} \leq 19\text{A}, di/dt \leq 300\text{A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse width  $\leq 300\ \mu\text{s}$ , Duty cycle  $\leq 2\%$
5. Essentially independent of operating temperature

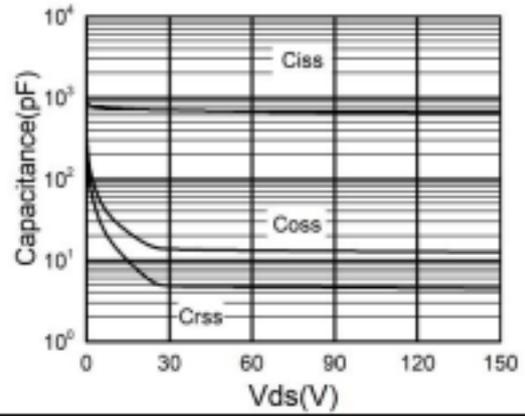
## Typical Electrical And Thermal Characteristics (Curves)



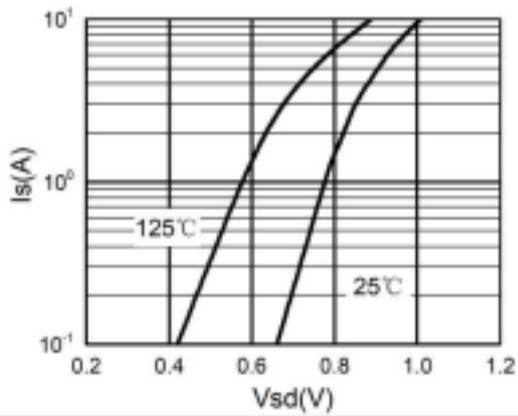
**Figure 7. Gate Charge Waveforms**



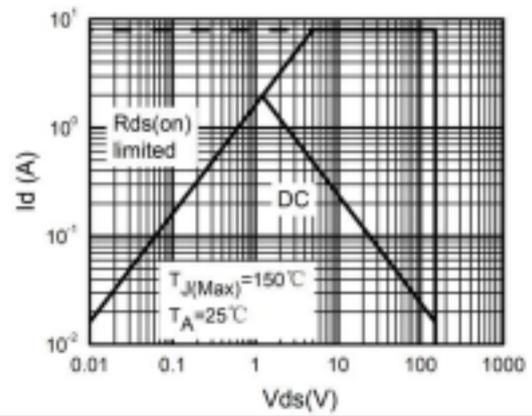
**Figure 8. Capacitance**



**Figure 9. Body-Diode Characteristics**



**Figure 10. Maximum Safe Operating Area**



**Test Circuits and Waveforms**

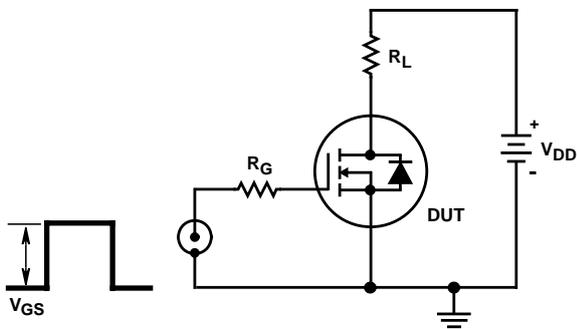


FIGURE 11. SWITCHING TIME TEST CIRCUIT

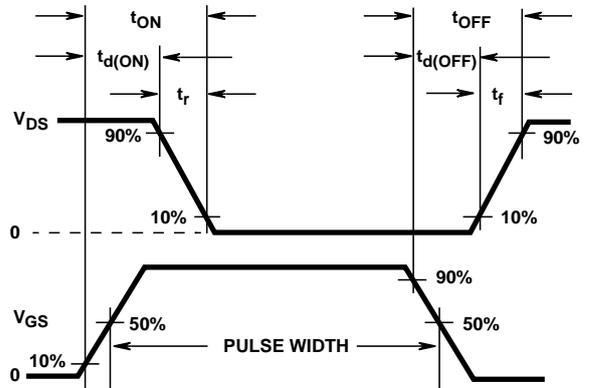


FIGURE 12. RESISTIVE SWITCHING WAVEFORMS

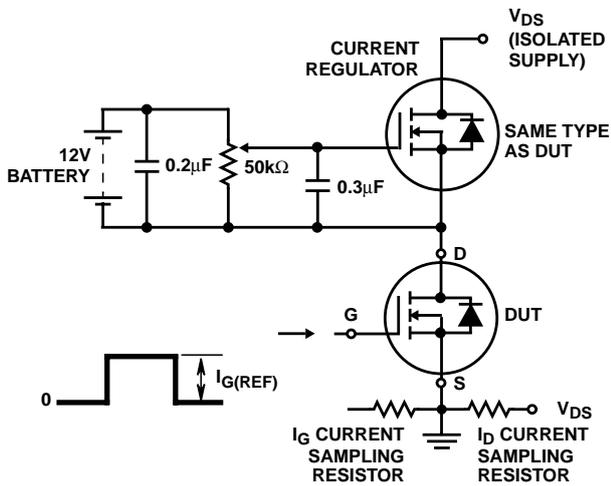


FIGURE 13. GATE CHARGE TEST CIRCUIT

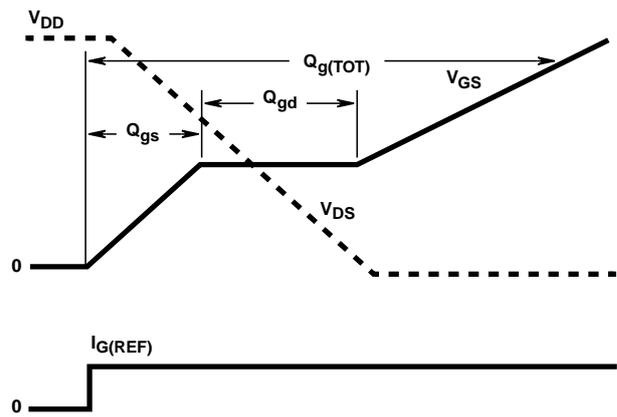
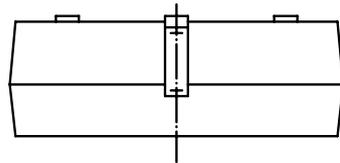
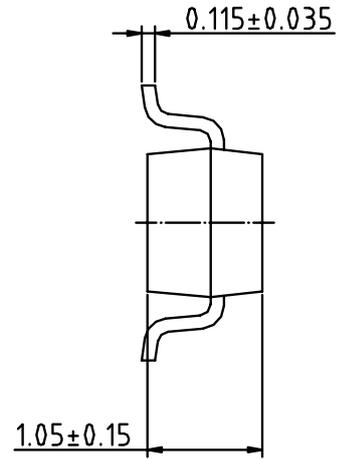
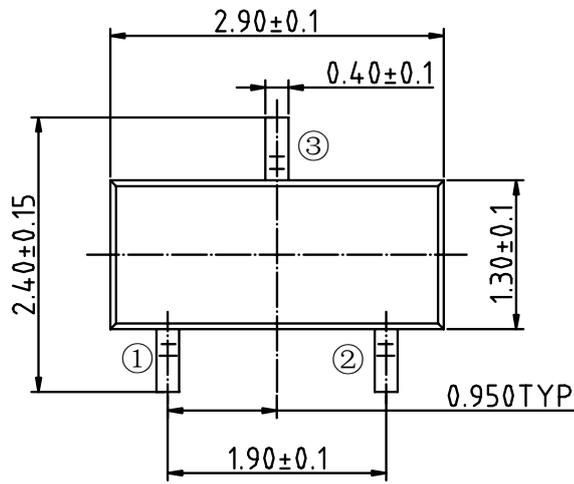


FIGURE 14. GATE CHARGE WAVEFORMS

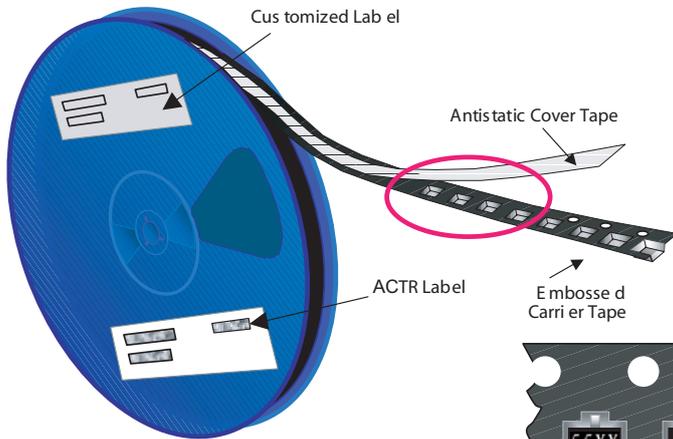
● Package Information



**SOT23**  
Units:mm

## SOT-23 Std Tape and Reel Data

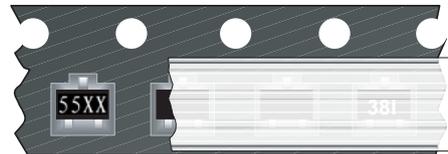
### SOT23-3L Packaging Configuration: Figure 1.0



**Packaging Description:**

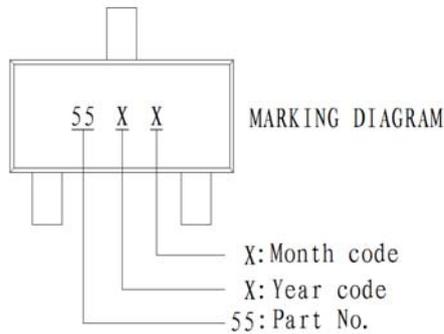
SOT23-3L parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 3,000 units per 7" or 177mm diameter reel. The reels are dark blue in color and is made of polystyrene plastic (anti-static coated). Other option comes in 10,000 units per 13" or 330cm diameter reel. This and some other options are described in the Packaging Information table.

These full reels are individually labeled and placed inside a standard immediate box made of recyclable corrugated brown paper with a Fairchild logo printing. One box contains five reels maximum. And these immediate boxes are placed inside a labeled shipping box which comes in different sizes depending on the number of parts shipped.

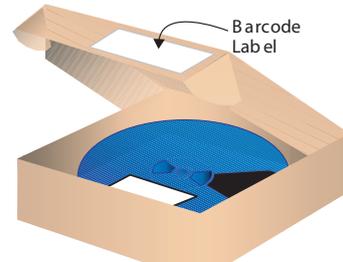


### SOT23-3L Unit Orientation

SOT23-3L Packaging Information		
Packaging Option	Standard (no flow code)	D87Z
Packaging type	TNR	TNR
Qty per Reel/Tube/Bag	3,000	10,000
Reel Size	7" Dia	13"
Box Dimension (mm)	193x183x80	355x333x40
Max qty per Box	15,000	30,000
Weight per unit (gm)	0.0082	0.0082
Weight per Reel (kg)	0.1175	0.4006
Note/Comments		

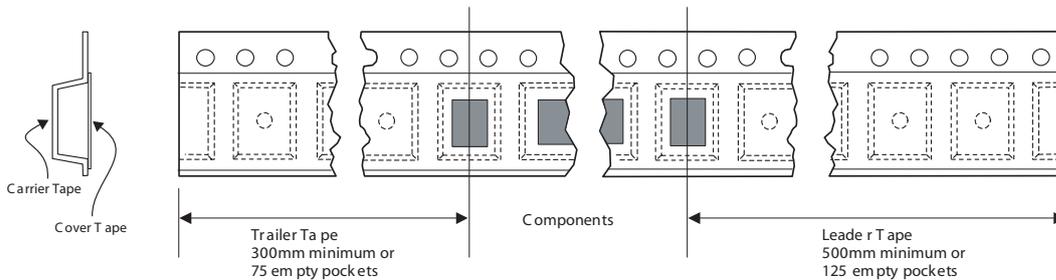


### Barcode Labels sample



193mm x 183mm x 80mm  
Pizza Box for Standard Option

### SOT23-3L Tape Leader and Trailer Configuration: Figure 2.0



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