P-Ch 30V Fast Switching MOSFETs

General Description

The MA3003J is the highest performance trench P-ch MOSFETs with extreme high cell density , which provide excellent RDSON and gate charge for most of the synchronous buck converter applications .

The MA3003J meet the RoHS and Green Product requirement , 100% EAS guaranteed with full function reliability approved.

Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

Product Summery

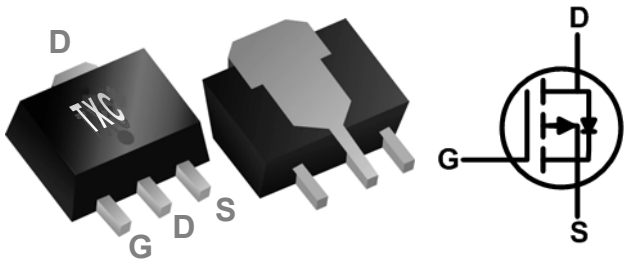
Green

BVDSS	RDSON	ID
-30V	32mΩ	-5.8A

Applications

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- Load Switch

SOT89 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-30	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_A=25°C	Continuous Drain Current, V_{GS} @ -10V[1]	-5.8	A
I_D@T_A=70°C	Continuous Drain Current, V_{GS} @ -10V[1]	-4.6	A
I_{DM}	Pulsed Drain Current[2]	-24	A
P_D@T_A=25°C	Total Power Dissipation[3]	1.5	W
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	---	85	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	21.6	°C/W

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-30	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , I_D=-1mA	---	-0.022	---	V/°C
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=-10V , I_D=-5A	---	26	32	mΩ
		V_{GS}=-4.5V , I_D=-4A	---	36	45	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.0	-1.5	-2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	4.6	---	mV/°C
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-24V , V_{GS}=0V , T_J=25°C	---	---	-1	uA
		V_{DS}=-24V , V_{GS}=0V , T_J=55°C	---	---	-5	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=-5V , I_D=-6A	---	17	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	13	26	Ω
Q_g	Total Gate Charge (-4.5V)	V_{DS}=-15V , V_{GS}=-4.5V , I_D=-5A	---	12.6	17.6	nC
Q_{gs}	Gate-Source Charge		---	4.8	6.7	
Q_{gd}	Gate-Drain Charge		---	4.8	6.7	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=-15V , V_{GS}=-10V , R_G=3.3Ω, I_D=-5A	---	4.6	9.2	ns
T_r	Rise Time		---	14.8	26.6	
$T_{d(off)}$	Turn-Off Delay Time		---	41	82	
T_f	Fall Time		---	19.6	39.2	
C_{iss}	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	1345	1883	pF
C_{oss}	Output Capacitance		---	194	272	
C_{rss}	Reverse Transfer Capacitance		---	158	221	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,4]	V_G=V_D=0V , Force Current	---	---	-5.8	A
I_{SM}	Pulsed Source Current[2,4]		---	---	-24	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=-1A , T_J=25°C	---	---	-1.2	V
t_{rr}	Reverse Recovery Time	I_F=-5A , dI/dt=100A/μs , T_J=25°C	---	16.3	---	nS
Q_{rr}	Reverse Recovery Charge		---	5.9	---	nC

Note :
1.The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.
2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
3.The power dissipation is limited by 150°C junction temperature
4.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

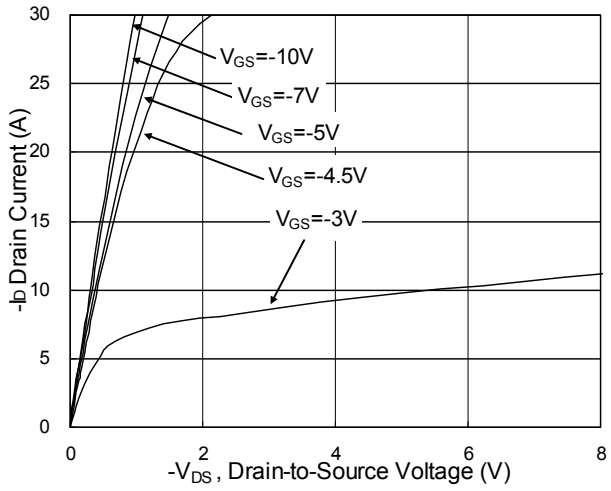


Fig.1 Typical Output Characteristics

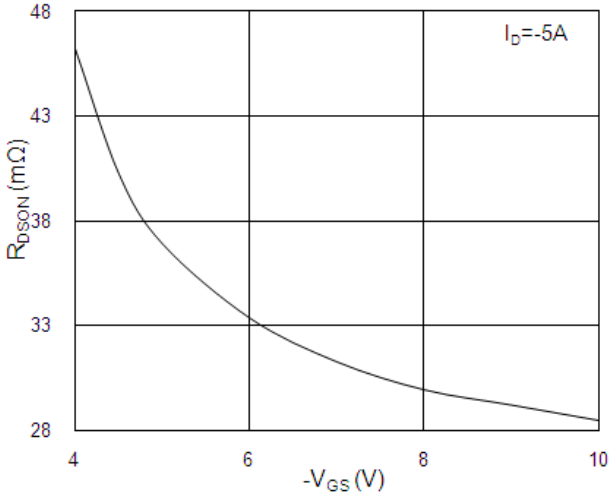


Fig.2 On-Resistance v.s Gate-Source

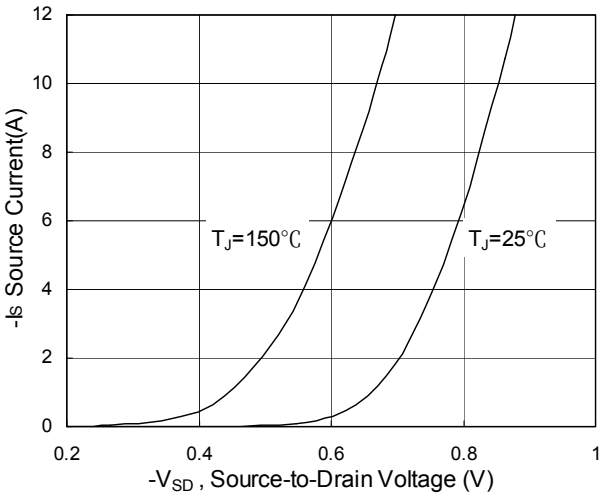


Fig.3 Forward Characteristics of Reverse

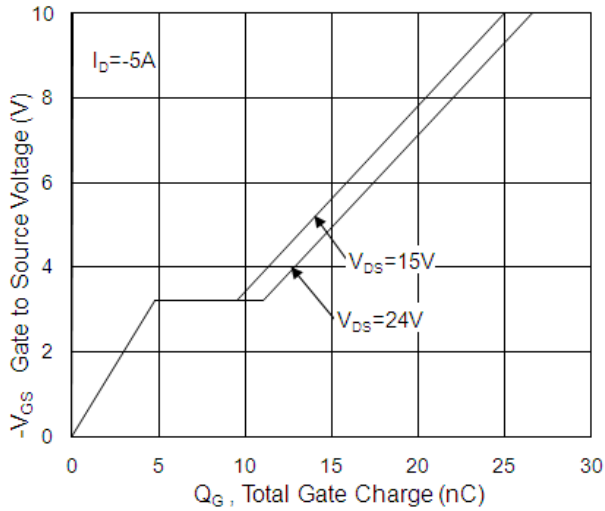


Fig.4 Gate-Charge Characteristics

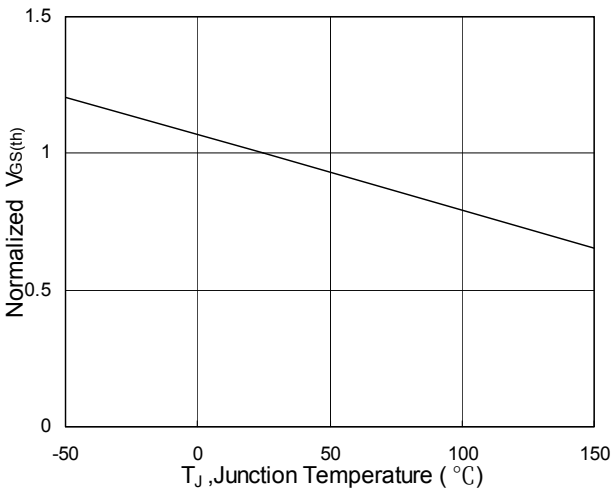


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

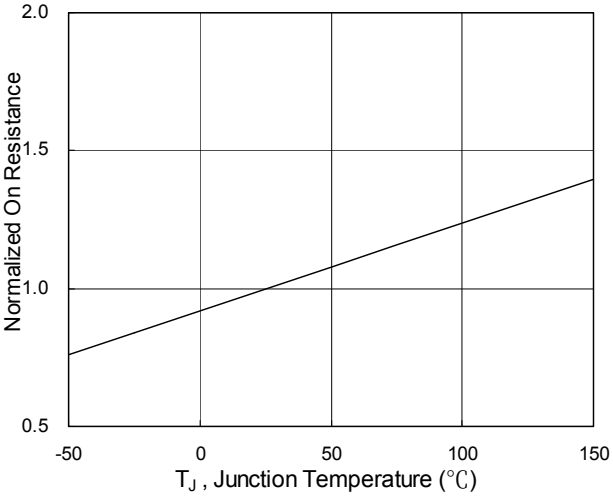


Fig.6 Normalized R_{DSON} vs. T_J

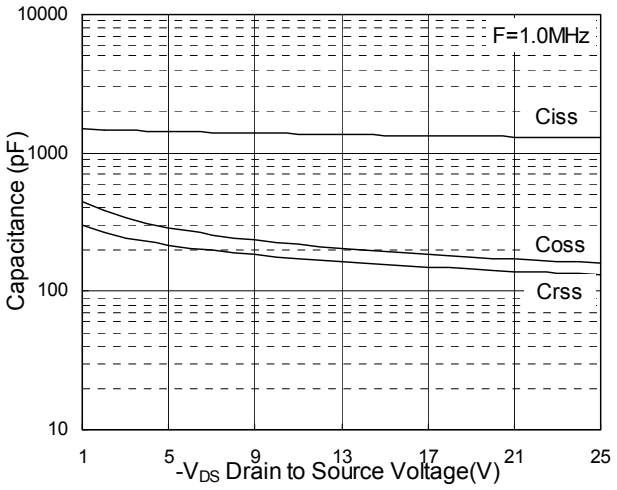


Fig.7 Capacitance

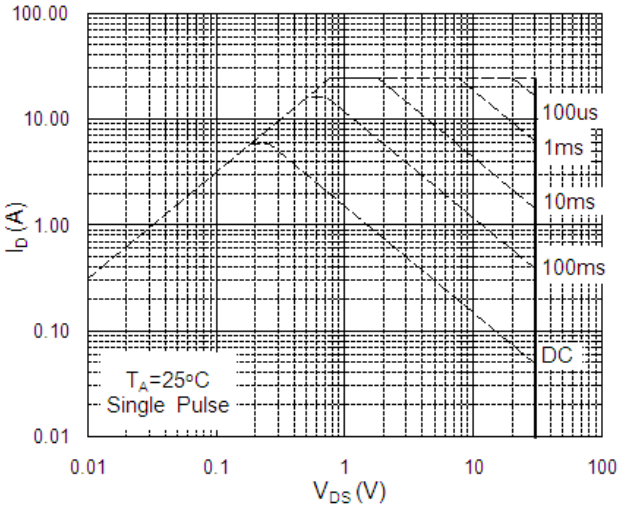


Fig.8 Safe Operating Area

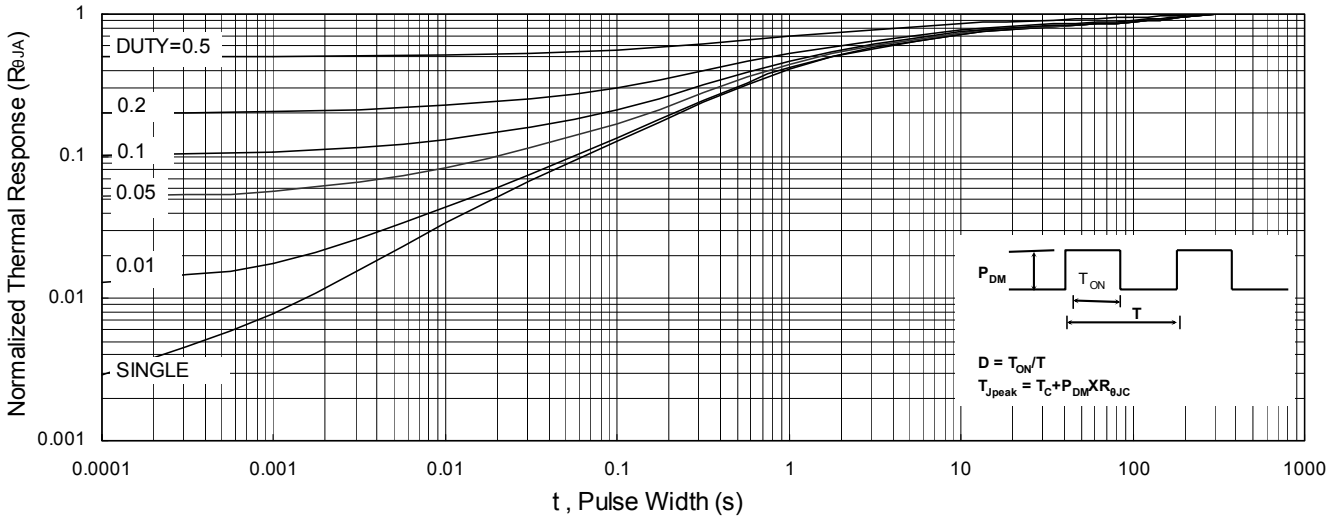


Fig.9 Normalized Maximum Transient Thermal Impedance

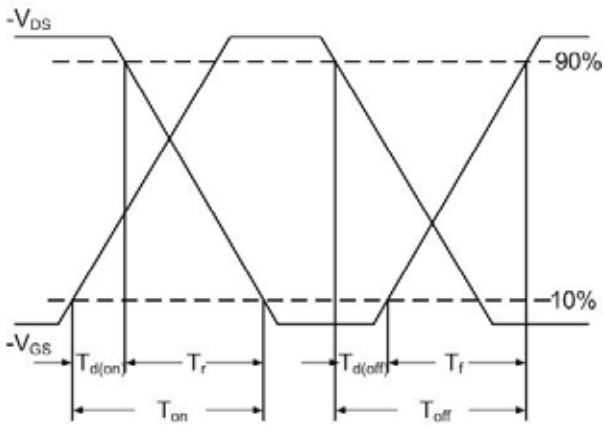


Fig.10 Switching Time Waveform

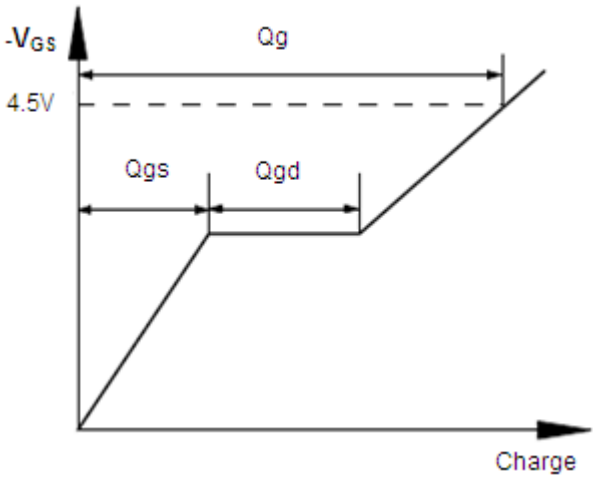
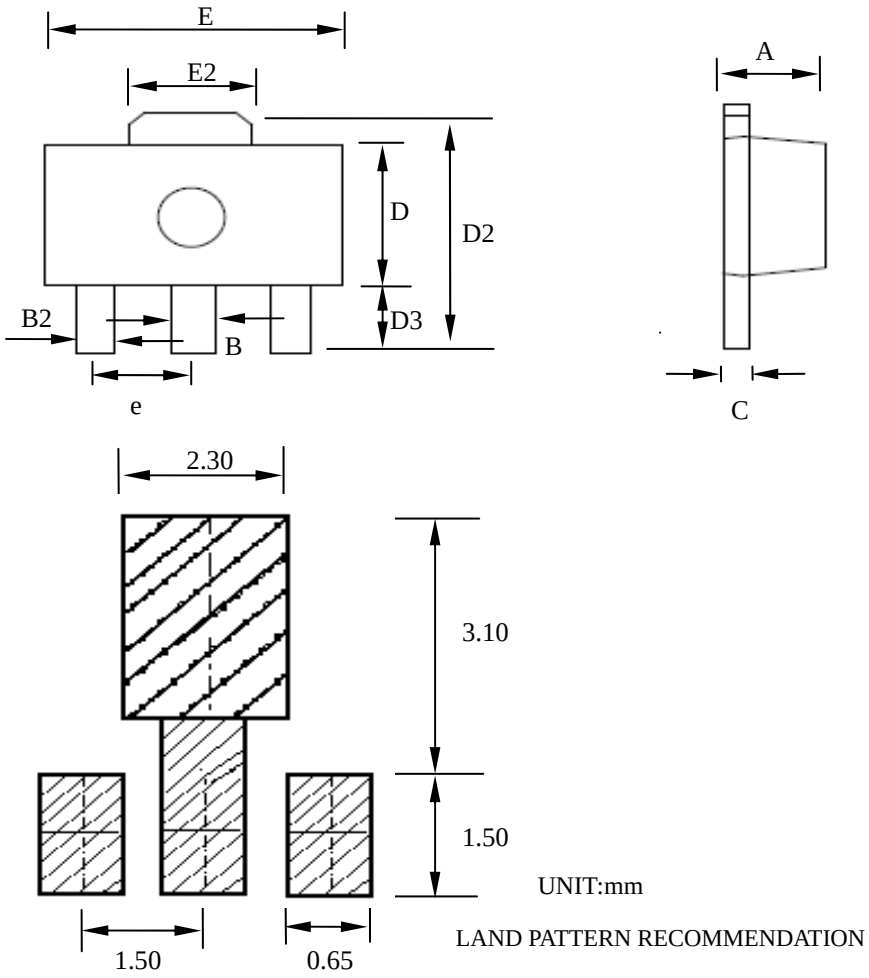


Fig.11 Gate Charge Waveform

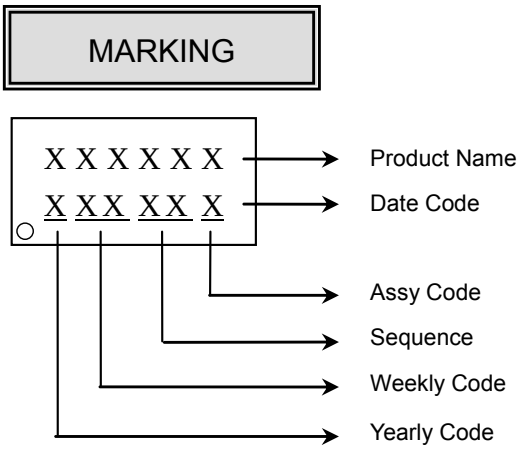
SOT-89 Outline

P-Ch 30V Fast Switching MOSFETs



UNIT:mm

LAND PATTERN RECOMMENDATION

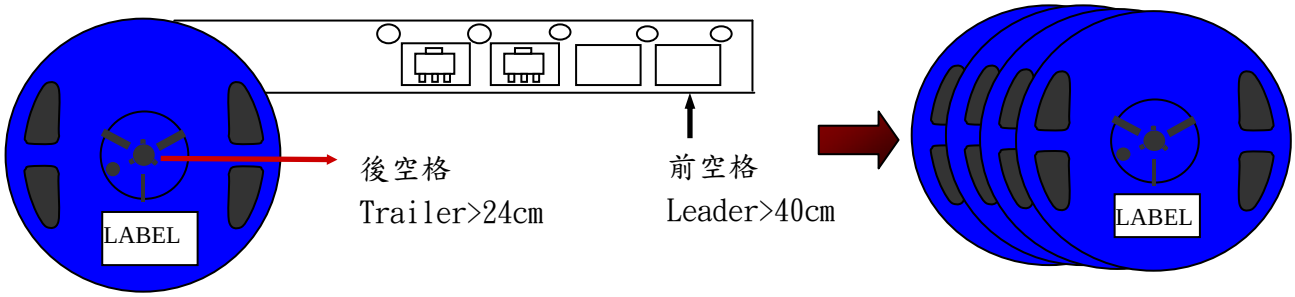


SYMBOLS	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.40	--	1.60	0.055	--	0.063
B	0.40	--	0.55	0.016	--	0.022
B2	0.35	--	0.48	0.014	--	0.019
C	0.35	--	0.43	0.014	--	0.017
D	2.40	--	2.60	0.094	--	0.102
D2	3.80	--	4.25	0.150	--	0.167
D3	0.80	--	1.20	0.031	--	0.047
E	4.40	--	4.60	0.173	--	0.181
E2	1.40	--	1.80	0.055	--	0.071
e	1.30	--	1.70	0.051	--	0.067

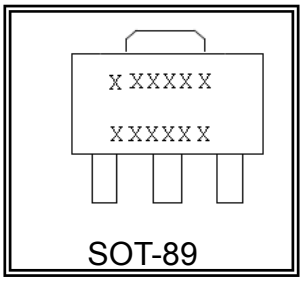
Note:

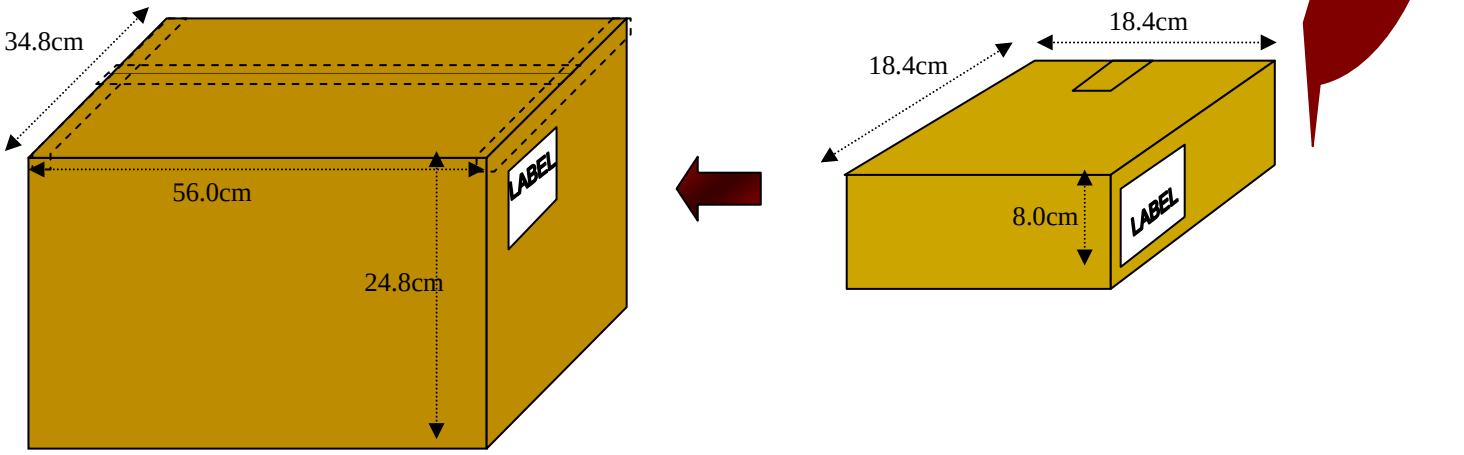
1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
2. CONTROLLING DIMENSION IS MILLIMETER CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACTLY.

Tape & Reel 繞捲及裝箱方式(SOT-89)



產品正印及方向－（正印為正時，Tape 圓孔在上方）





封裝形態 PKG TYPE	一 般 包 裝		
	一卷數量 Immediate Quantity	中箱數量 Intermediate Quantity	外箱裝置/數量 Carton Quantity
SOT-89	1000pcs	4000pcs	48K
	Reel（7”）	Box(4 reels)	Carton(12 Box)