Description

The SX5N50D uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as hight EAS. This device is suitable for use as a Battery protection or in other Switching application.

General Features

V_{DS} = 500V I_D =5 A

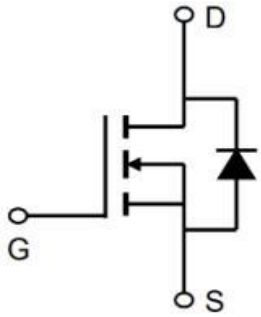
$R_{DS(ON)}$ < 1.6Ω @ V_{GS}=10V

Application

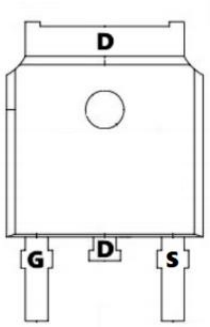
Switch Mode Power Supply (SMPS)

Uninterruptible Power Supply (UPS)

Power Factor Correction (PFC)



TO-252-3L



Absolute Maximum Ratings (T_C=25℃ unless otherwise specified)

Symbol	Parameter		Max. TO-252	Units
V_{DSS}	Drain-Source Voltage		500	V
V_{GSS}	Gate-Source Voltage		±30	V
I_D	Continuous Drain Current	T_C = 25℃	5	A
		T_C = 100℃	3.4	A
I_{DM}	Pulsed Drain Current note1		20	A
E_{AS}	Single Pulsed Avalanche Energy note2		90	mJ
P_D	Power Dissipation	T_C = 25℃	45	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case		2.8	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient		60	℃/W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	℃

Electrical Characteristics (T_C=25℃ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS} = 0V,I_D = 250μA	500	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 500V, V_{GS} = 0V, T_J = 25℃	-	-	1	μA
I_{GSS}	Gate to Body Leakage Current	V_{GS} = ±30V	-	-	±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} =V_{GS},I_D = 250μA	2	3	4	V
$R_{DS(on)}$	Static Drain-Source On-Resistance note3	V_{GS} =10V, I_D = 2.5A	-	1.35	1.6	Ω
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	-	462	-	pF
C_{oss}	Output Capacitance		-	54.2	-	pF
C_{rss}	Reverse Transfer Capacitance		-	8.8	-	pF
Q_g	Total Gate Charge	V_{DD}=400V, I_D =5A, V_{GS} = 10V	-	13.5	-	nC
Q_{gs}	Gate-Source Charge		-	2	-	nC
Q_{gd}	Gate-Drain(“Miller”) Charge		-	6	-	nC
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 250V, I_D =5A, R_G = 25Ω	-	10	-	ns
t_r	Turn-On Rise Time		-	25	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	40	-	ns
t_f	Turn-Off Fall Time		-	52	-	ns
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	5	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	20	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_{SD}= 5A, T_J = 25℃	-	-	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_S = 5A, di/dt =100A/μs	-	220	-	ns
Q_{rr}	Reverse Recovery Charge		-	3	-	μC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. I_{AS} = 3A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 1%

Typical Characteristics

Figure1: Output Characteristics

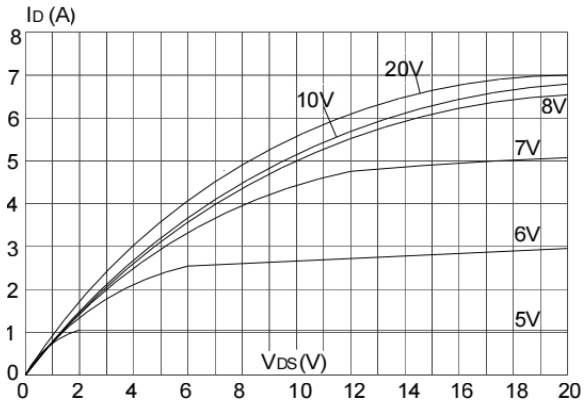


Figure 2: Typical Transfer Characteristics

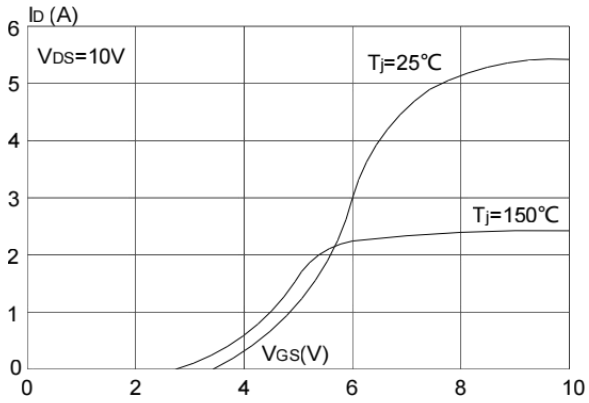


Figure 3: On-resistance vs. Drain Current

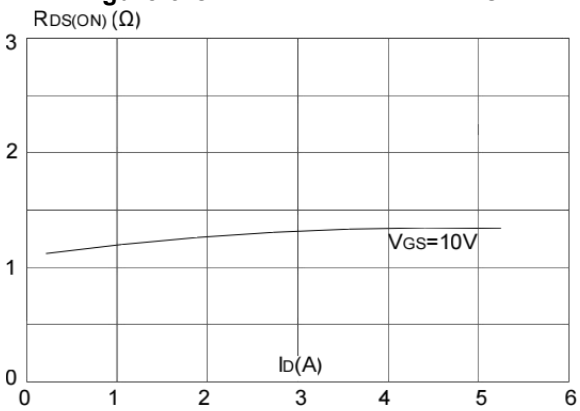


Figure 4: Body Diode Characteristics

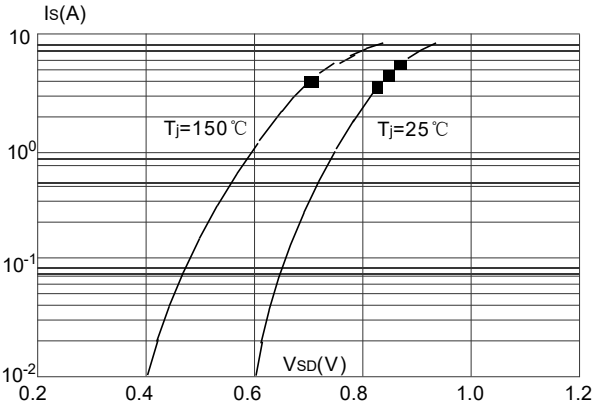


Figure 5: Gate Charge Characteristics

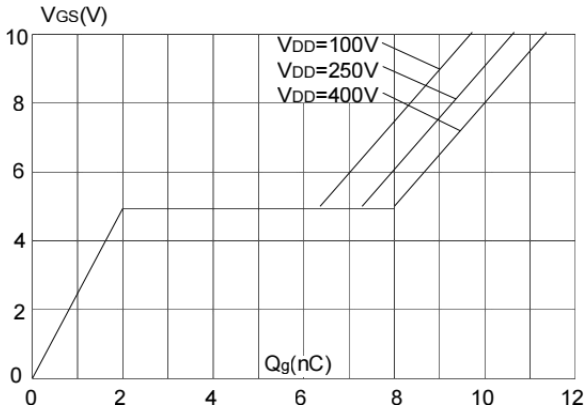
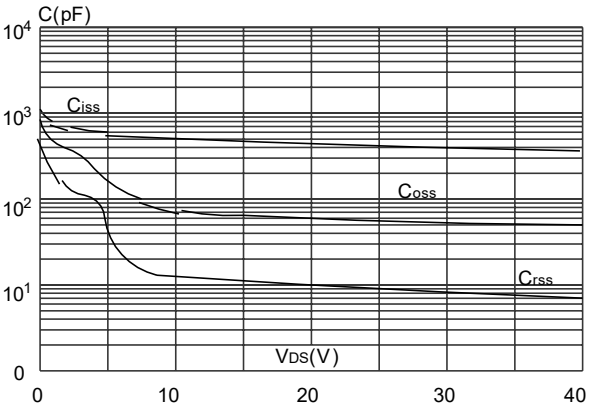


Figure 6: Capacitance Characteristics



Typical Characteristics

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

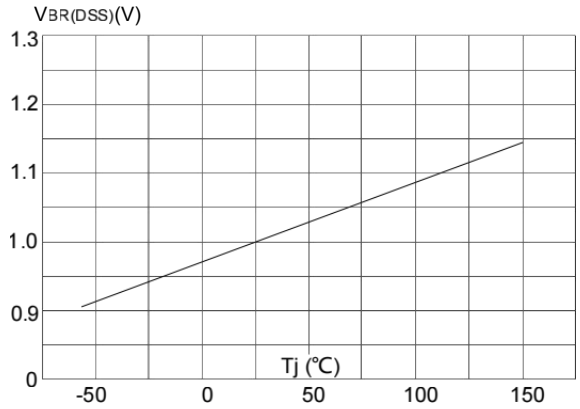


Figure 8: Normalized on Resistance vs. Junction Temperature

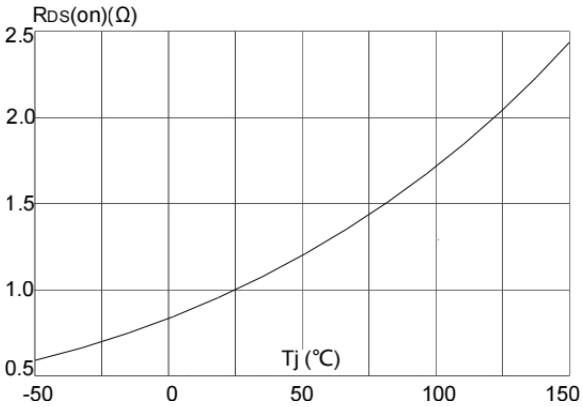


Figure 9: Maximum Safe Operating Area

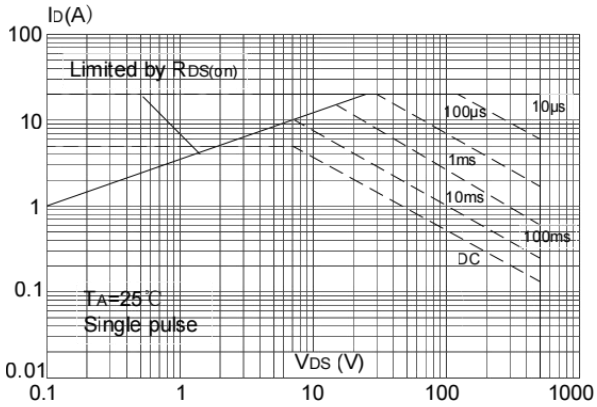


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

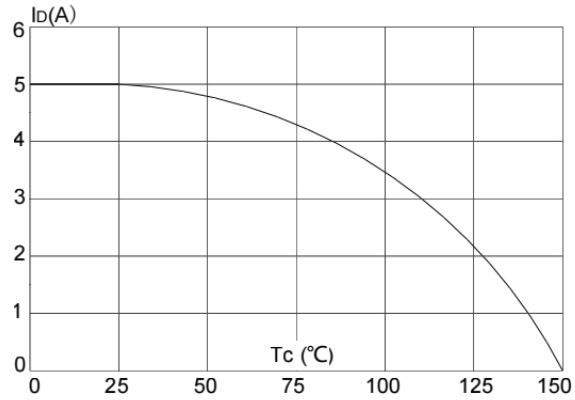


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

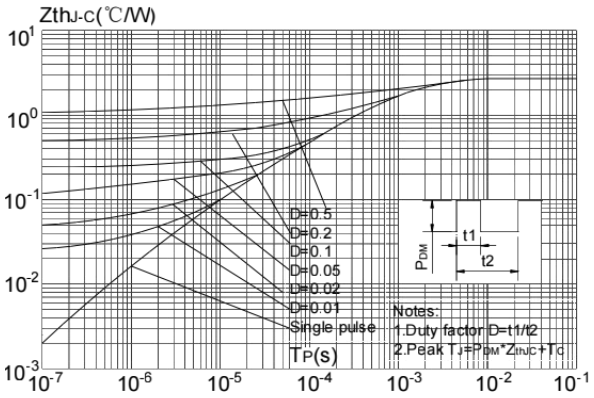
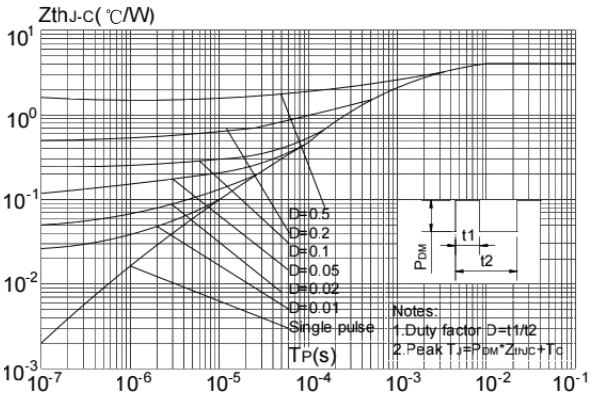


Figure.12: Maximum Effective Transient Thermal Impedance, Junction-to-Case



Typical Characteristics

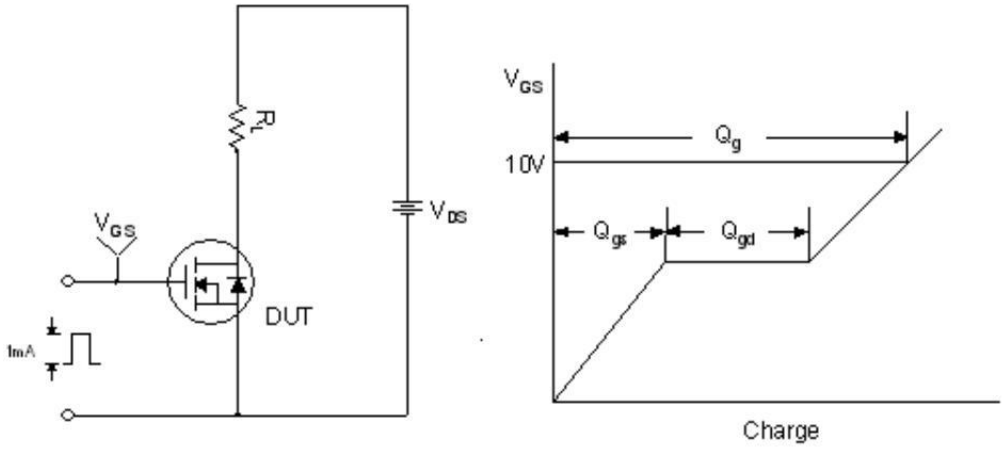


Figure 13. Gate Charge Test Circuit & Waveform

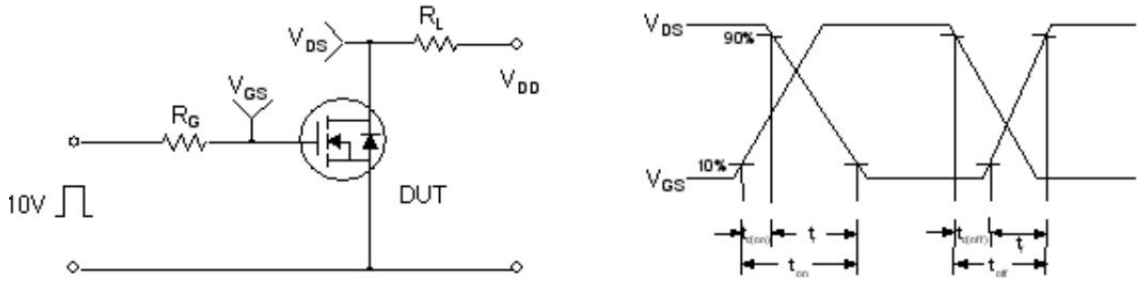


Figure 14. Resistive Switching Test Circuit & Waveforms

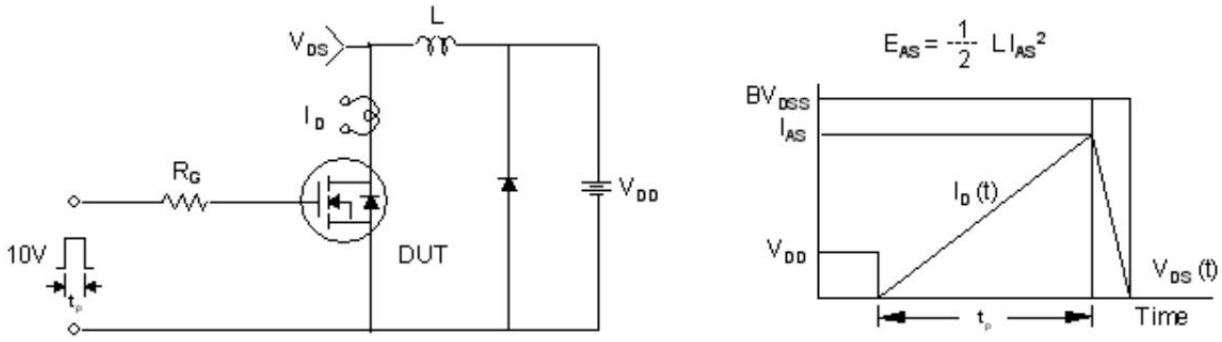


Figure 15. Unclamped Inductive Switching Test Circuit & Waveforms

Typical Characteristics

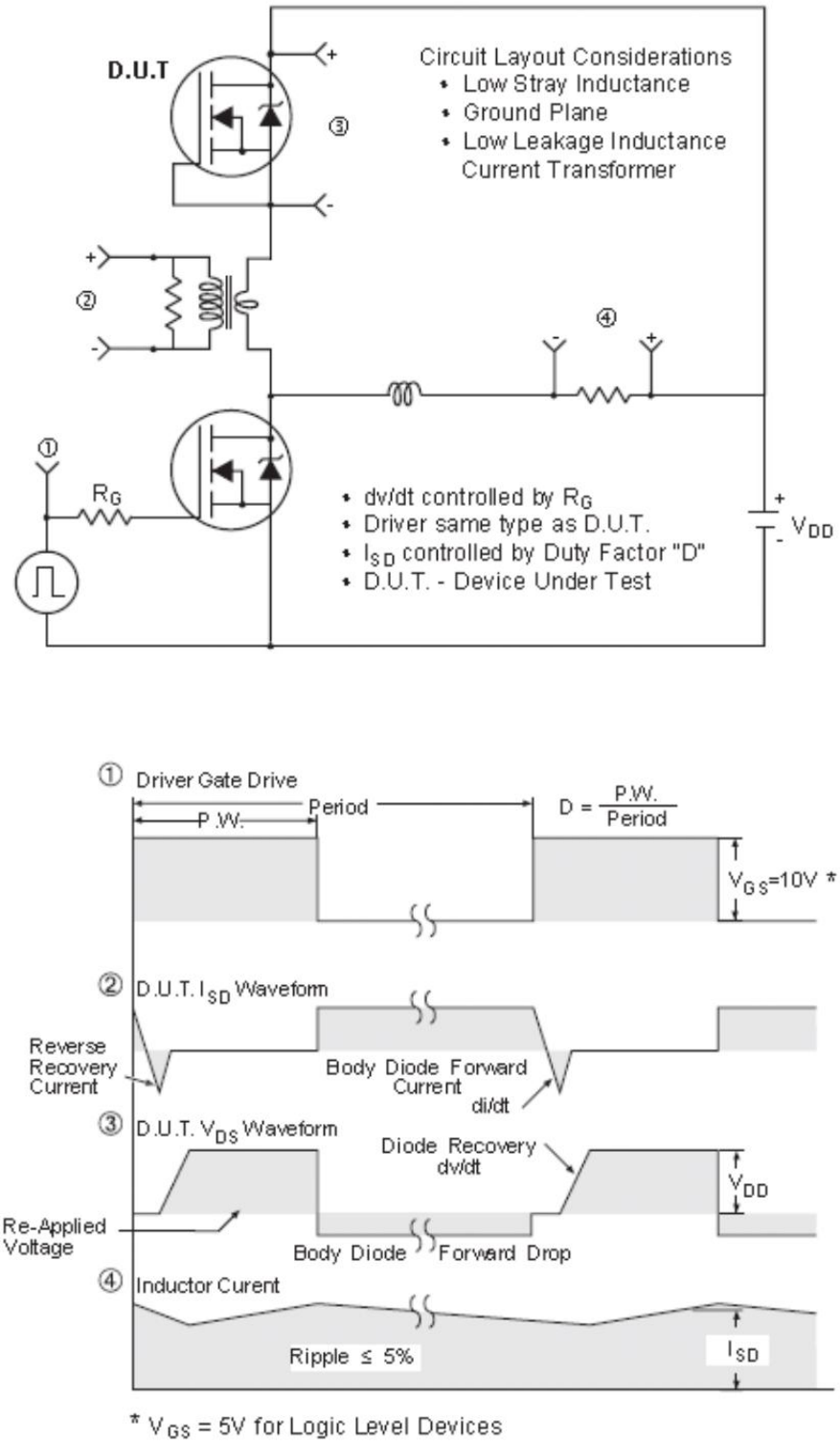
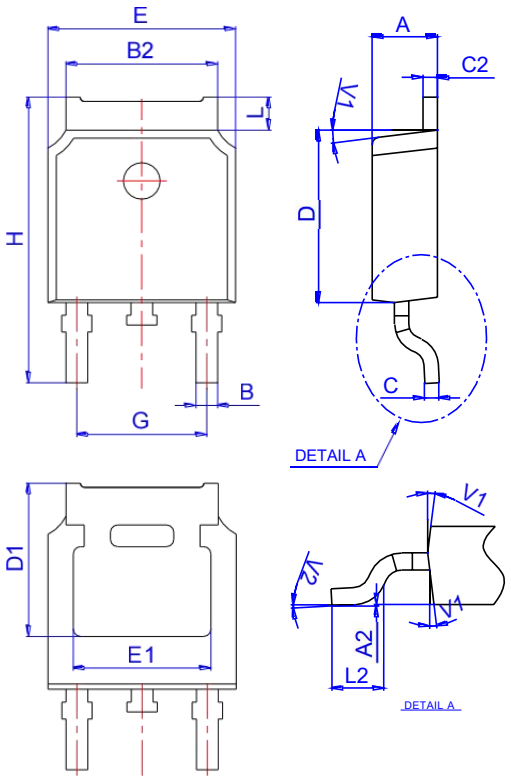


Figure 16. Peak Diode Recovery dv/dt Test Circuit & Waveforms (For N-channel)

Package Mechanical Data：TO-252-3L



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
TAPING	TO-252-3L		2500