QM3098M6

N-Channel 30V Fast Switching MOSFET

General Description

The QM3098M6 is the highest performance trench N-channel MOSFET with extreme high cell density , which provide excellent RDSON and gate charge for most of the synchronous buck converter applications .

The QM3098M6 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 Summary

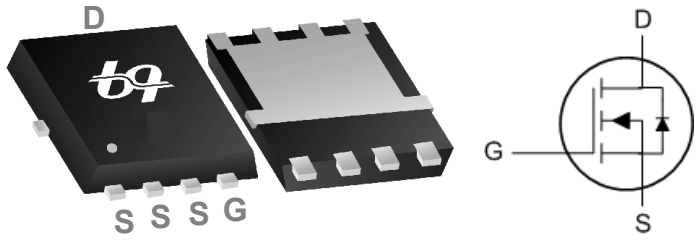
Green RoHS、HF、Pb

BVDSS	RDSON (VGS=10V)	ID (TC=25℃)
30V	3mΩ	128A

Applications

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

PRPAK5X6 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		t≦10s	Steady State	
V_{DS}	Drain-Source Voltage	30		V
V_{GS}	Gate-Source Voltage	±20		V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	128		A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V[1]	81		A
I_D@T_A=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	37	20	A
I_D@T_A=70℃	Continuous Drain Current, V_{GS} @ 10V[1]	30	16	A
I_{DM}	Pulsed Drain Current[2]	230		A
EAS	Single Pulse Avalanche Energy[3]	195.3		mJ
I_{AS}	Avalanche Current	62.5		A
P_D@T_C=25℃	Total Power Dissipation[4]	78		W
P_D@T_A=25℃	Total Power Dissipation[4]	2		W
T_{STG}	Storage Temperature Range	-55 to 150		℃
T_J	Operating Junction Temperature Range	-55 to 150		℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient[1]	---	62	℃/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient[1] (t≦10s)	---	18.7	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	1.6	℃/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
$\triangle BV_{DSS}/\triangle T_J$	BVDSS Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.03	---	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=30A	---	2.4	3	mΩ
		V_{GS}=4.5V , I_D=15A	---	3.2	4	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.2	1.5	2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5.5	---	mV/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=24V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=24V , V_{GS}=0V , T_J=55℃	---	---	5	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=5V , I_D=30A	---	57.7	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	1.3	---	Ω
Q_g	Total Gate Charge (4.5V)	V_{DS}=15V , V_{GS}=4.5V , I_D=15A	---	25.6	---	nC
Q_{gs}	Gate-Source Charge		---	7.3	---	
Q_{gd}	Gate-Drain Charge		---	10.6	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=15V , V_{GS}=10V , R_G=3.3Ω I_D=15A	---	13.3	---	ns
T_r	Rise Time		---	47.4	---	
$T_{d(off)}$	Turn-Off Delay Time		---	54.4	---	
T_f	Fall Time		---	17.4	---	
C_{iss}	Input Capacitance	V_{DS}=15V , V_{GS}=0V , f=1MHz	---	2780	---	pF
C_{oss}	Output Capacitance		---	439	---	
C_{rss}	Reverse Transfer Capacitance		---	372	---	

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy[5]	V_{DD}=25V , L=0.1mH , I_{AS}=44.2A	97.7	---	---	mJ

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,6]	V_G=V_D=0V , Force Current	---	---	128	A
I_{SM}	Pulsed Source Current[2,6]		---	---	230	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1	V
Trr	Reverse Recovery Time	IF=30A , dI/dt=100A/μs , T_J=25℃	---	13.5	---	nS
Qrr	Reverse Recovery Charge		---	2.1	---	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 EAS data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.1mH.
4.The power dissipation is limited by 150℃ junction temperature
5.The Min. value is 100% EAS tested guarantee.
6.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

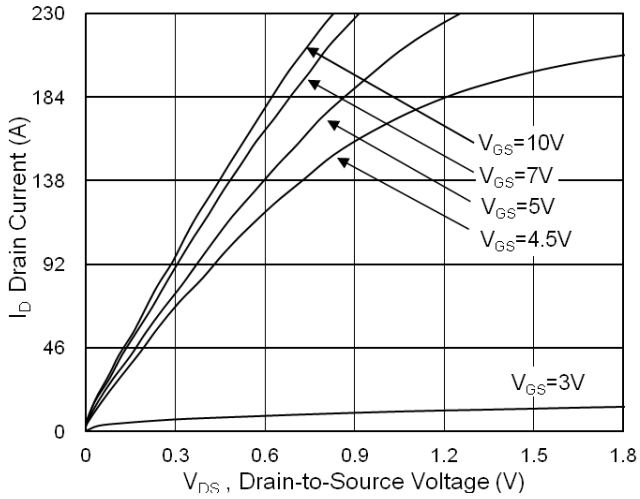


Fig.1 Typical Output Characteristics

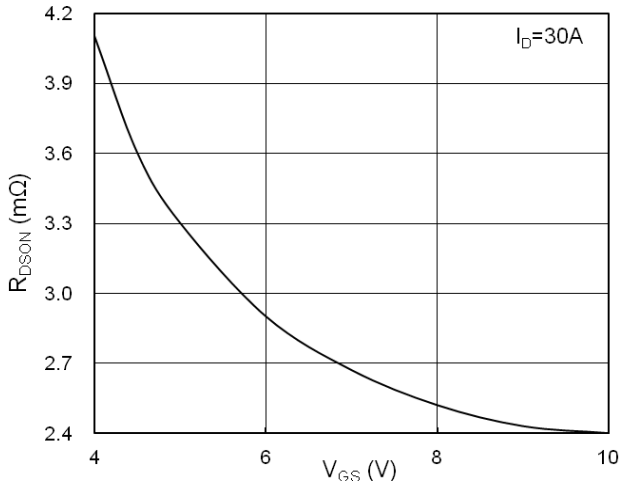


Fig.2 On-Resistance vs. Gate-Source

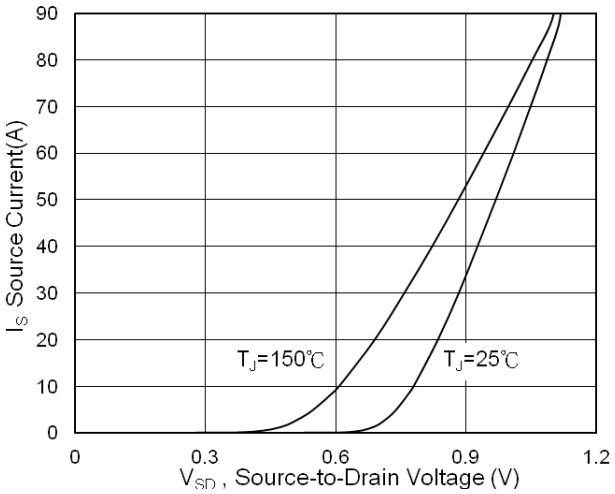


Fig.3 Forward Characteristics of Reverse

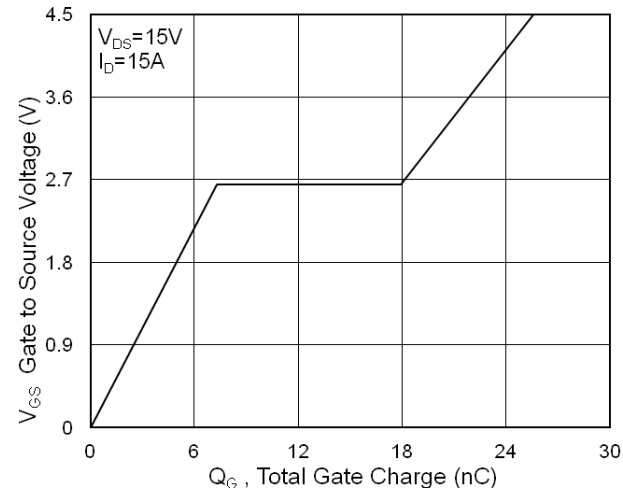


Fig.4 Gate-Charge Characteristics

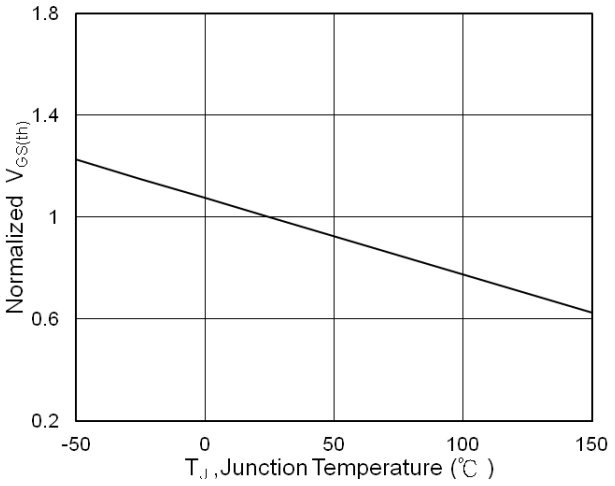


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

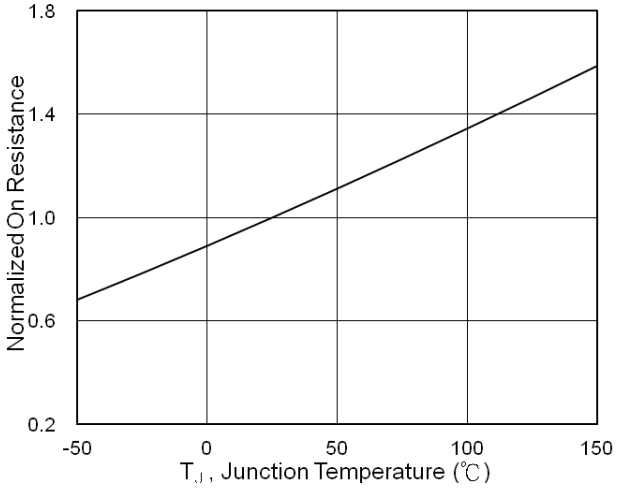


Fig.6 Normalized R_{DSON} vs. T_J

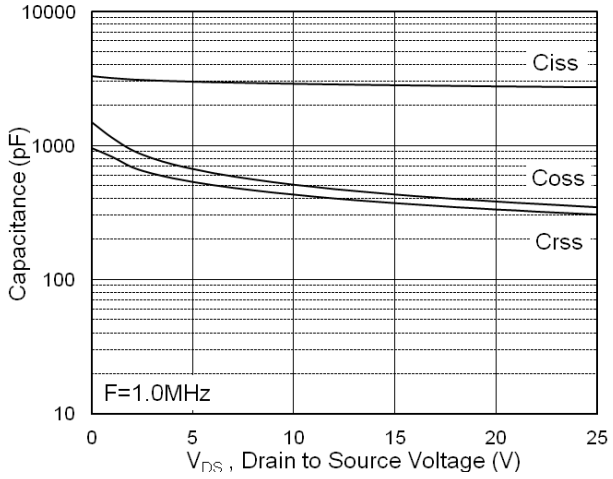


Fig.7 Capacitance

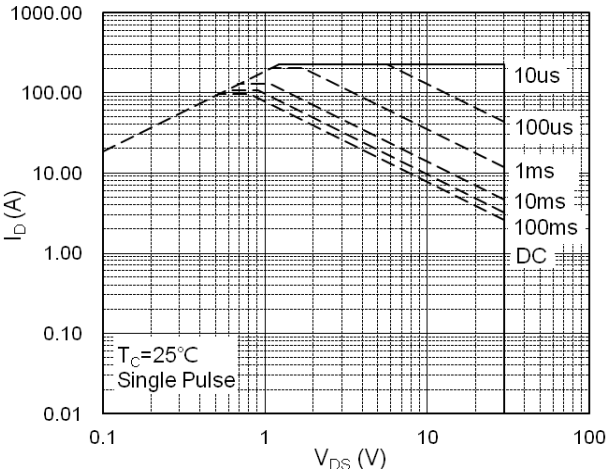


Fig.8 Safe Operating Area

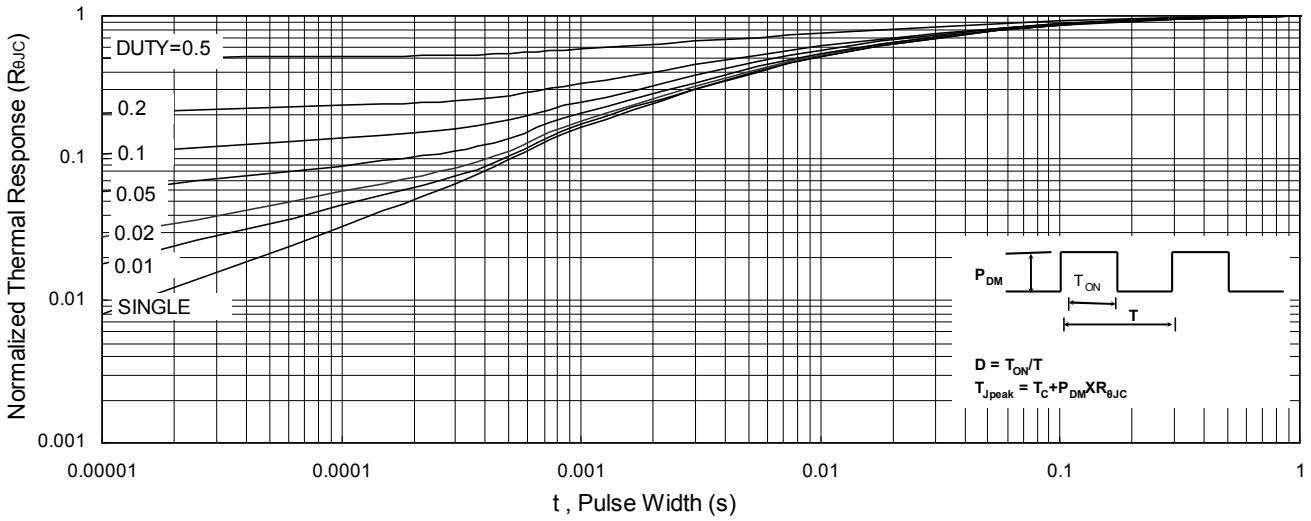


Fig.9 Normalized Maximum Transient Thermal Impedance

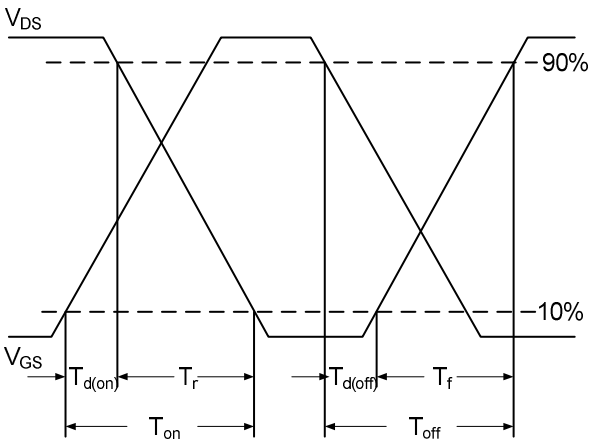


Fig.10 Switching Time Waveform

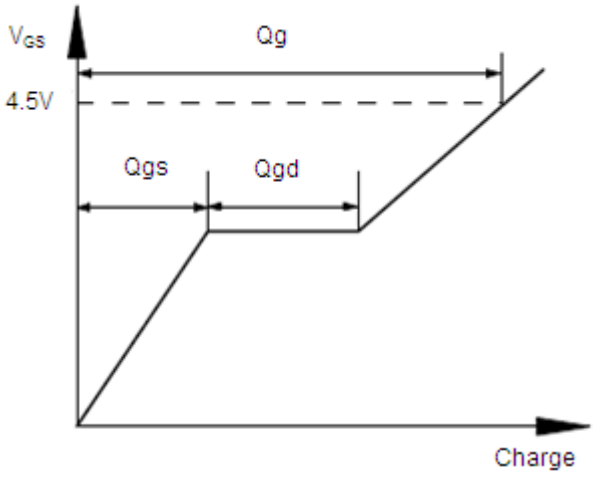


Fig.11 Gate Charge Waveform

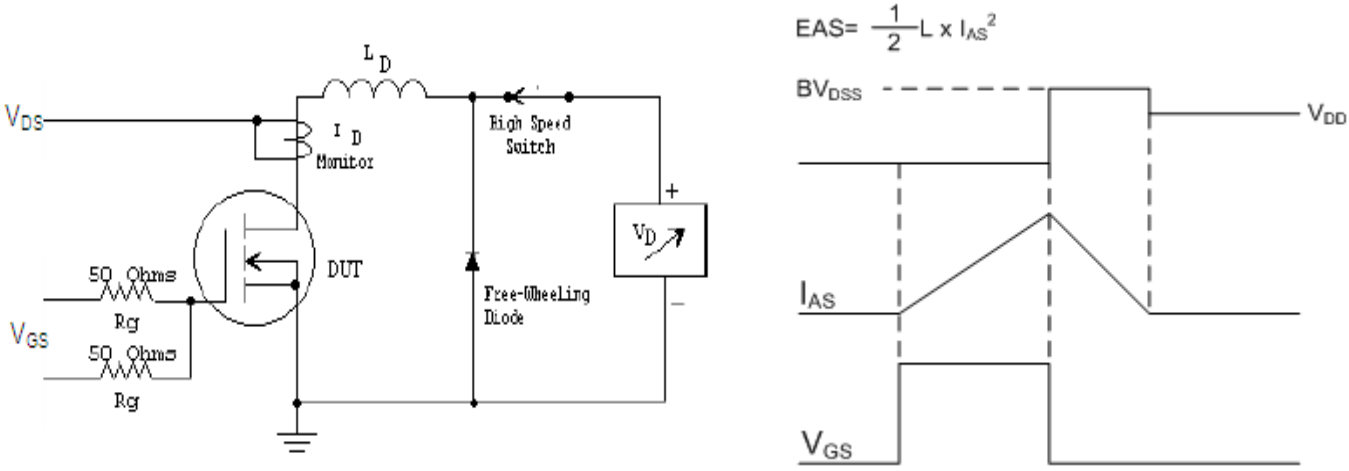
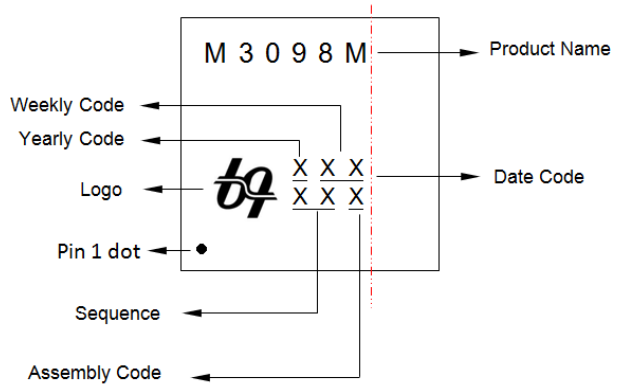
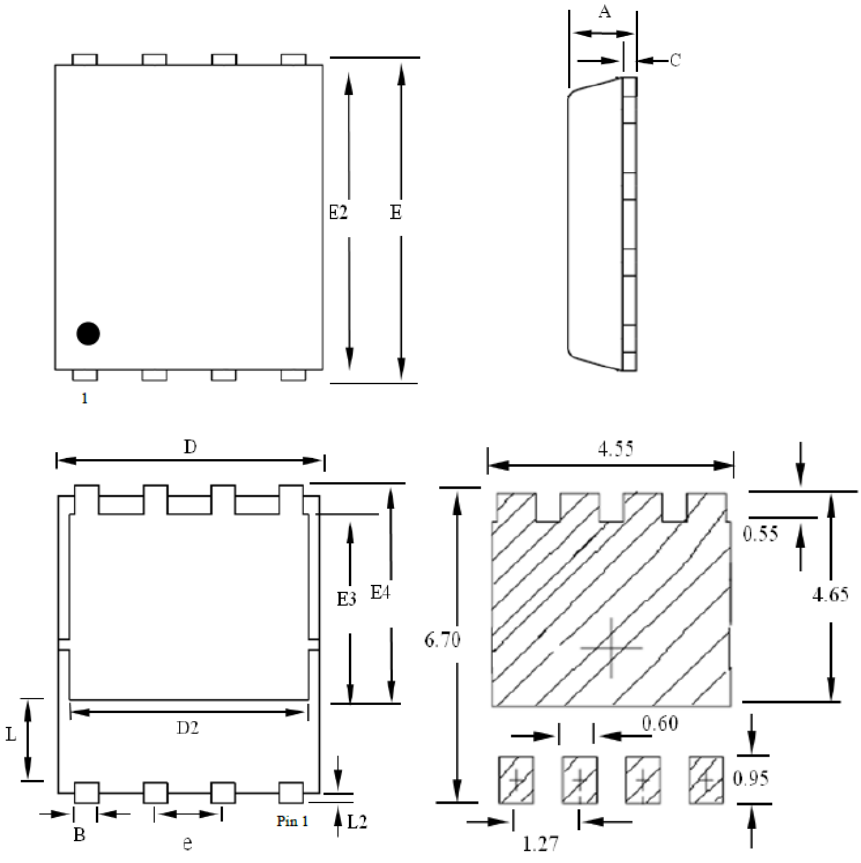


Fig.12 Unclamped Inductive Switching Test Circuit & Waveforms

Top Marking



PRPAK5X6 Package Outline Drawing



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	0.90	1.00	1.20
B	0.33	--	0.51
C	0.20	--	0.34
D	4.50	--	5.10
D2	3.60	--	4.22
E	5.90	--	6.13
E2	5.50	--	5.84
E3	3.18	--	4.30
E4	3.69	--	4.39
L	1.10	--	1.39
L2	0.02	--	0.33
e	--	1.27	--

LAND PATTERN RECOMMENDATION (Unit : mm)

Note:
1. ALL DIMENSIONS LISTED ON THE DRAWING MEETING JEDEC STANDARD.
2. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
3. RECOMMENDED LAND PATTERN DESIGN IS ONLY FOR REFERENCE