General Description

The WSK290N04G6 is the highest performance trench N-Ch MOSFET with extreme high cell density , which provide excellent RDSON and gate charge for most of the synchronous buck converter applications .

The WSK290N04G6 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

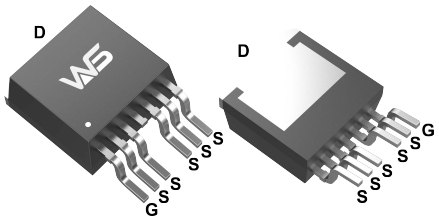
Product Summery

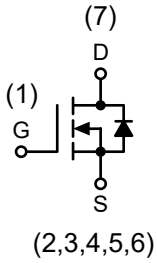
BVDSS	RDSON	ID
40V	1.2mΩ	290A

Applications

- Switching application
- Power Management for Inverter Systems.

TO-263-6L Pin Configuration





Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (T_C=25°C Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage		40	V
V_{GSS}	Gate-Source Voltage		±20	
T_J	Maximum Junction Temperature		175	℃
T_{STG}	Storage Temperature Range		-55 to 175	℃
I_S	Diode Continuous Forward Current	T_C=25℃	190	A
Mounted on Large Heat Sink				
I_{DM}	Pulsed Drain Current [1]	T_C=25℃	1015	A
I_D	Continuous Drain Current	T_C=25℃	290	A
		T_C=100℃	207	
P_D	Maximum Power Dissipation	T_C=25℃	230	W
		T_C=100℃	115	
$R_{\theta JC}$	Thermal Resistance-Junction to Case		0.65	℃/W
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		50	
Avalanche Ratings				
E_{AS}	Avalanche Energy, Single Pulsed	L=0.5mH	1400	mJ

NOTE:

1,Pulse width limited by maximum junction temperature.

2,UIS tested and pulse width limited by maximum junction temperature (initial temperature Tj=25°C.

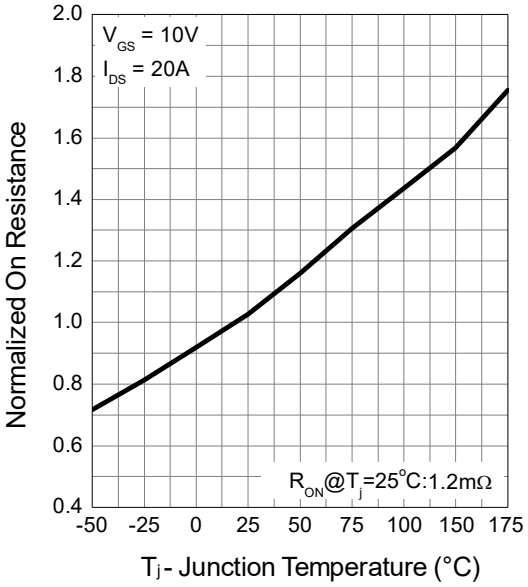
Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250μA	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=40V, V_{GS}=0V	-	-	1	μA
		T_J=85℃	-	-	10	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	1.0	1.8	2.5	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$ *	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=30A	-	1.2	1.6	mΩ
$R_{DS(ON)}$ *	Drain-Source On-state Resistance	V_{GS}=4.5V, I_{DS}=20A	-	1.5	2.5	mΩ
Diode Characteristics						
V_{SD} *	Diode Forward Voltage	I_{SD}=20A, V_{GS}=0V	-	0.8	1.2	V
t_{rr}	Reverse Recovery Time	I_{SD}=104A, dI_{SD}/ dt=100A/μs	-	45	-	ns
Q_{rr}	Reverse Recovery Charge		-	98	-	nC
Dynamic Characteristics						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	1.0	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=20V, Frequency=1.0MHz	-	8102	-	pF
C_{oss}	Output Capacitance		-	945	-	
C_{rss}	Reverse Transfer Capacitance		-	410	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=20V, R_G=6 Ω, I_{DS} =20A, V_{GS}=10V .,	-	29	-	ns
T_r	Turn-on Rise Time		-	17	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	150	-	
T_f	Turn-off Fall Time		-	65	-	
Gate Charge Characteristics						
Q_g	Total Gate Charge	V_{DS}=20V, V_{GS}=10V, I_{DS}=20A	-	142	-	nC
Q_{gs}	Gate-Source Charge		-	34	-	
Q_{gd}	Gate-Drain Charge		-	25	-	

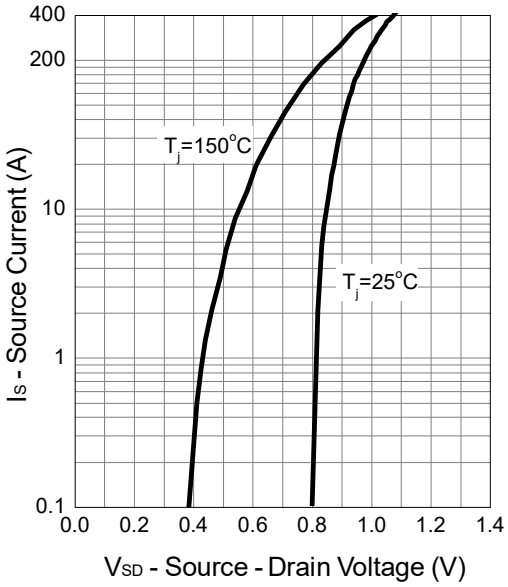
Note * : Pulse test ; pulse width ≤300μs, duty cycle≤2%.

Typical Characteristics

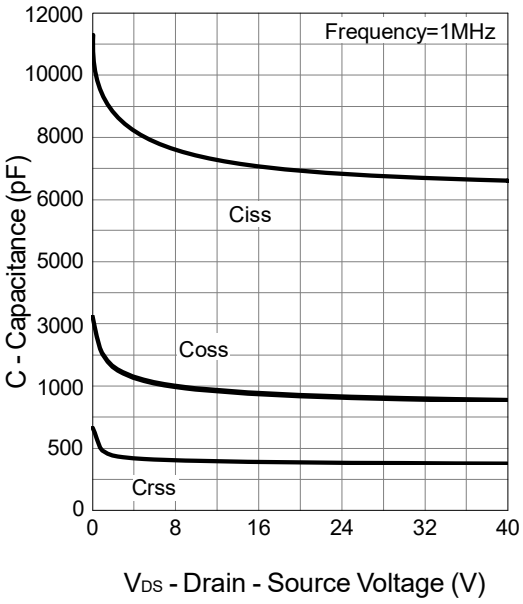
Drain-Source On Resistance



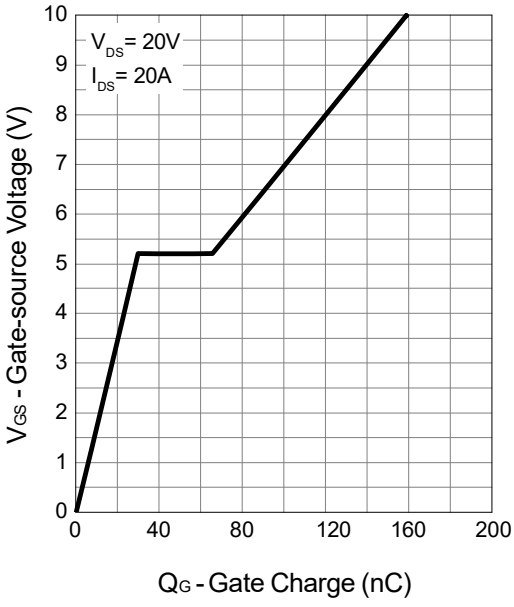
Source-Drain Diode Forward



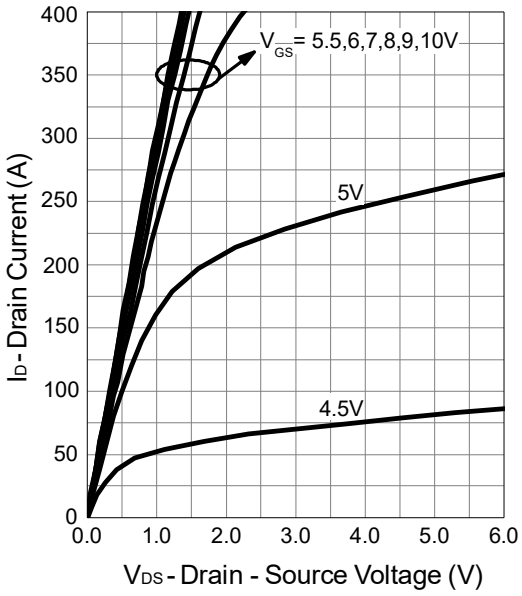
Capacitance



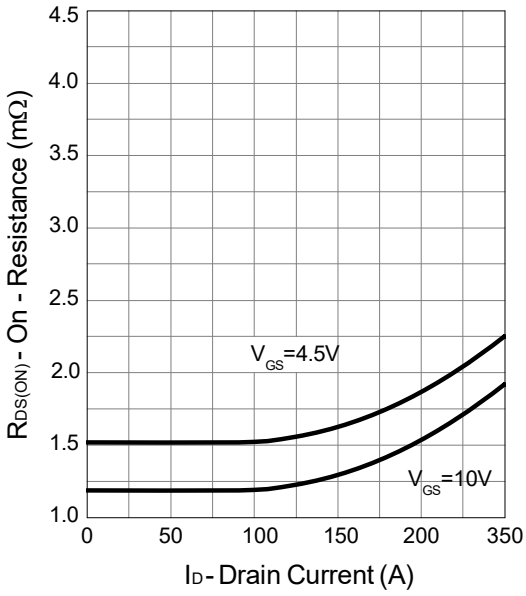
Gate Charge



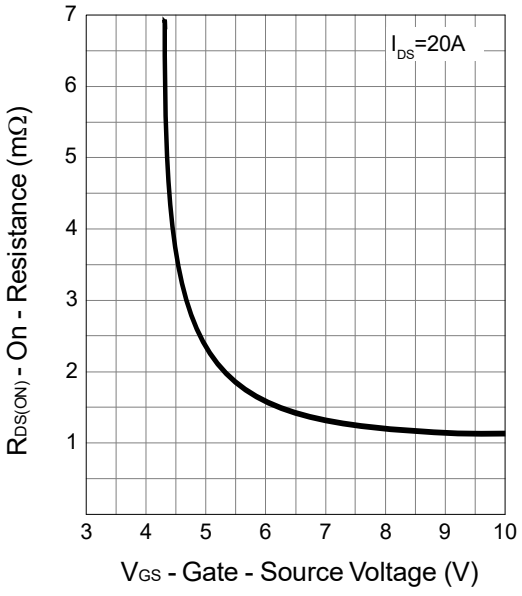
Output Characteristics



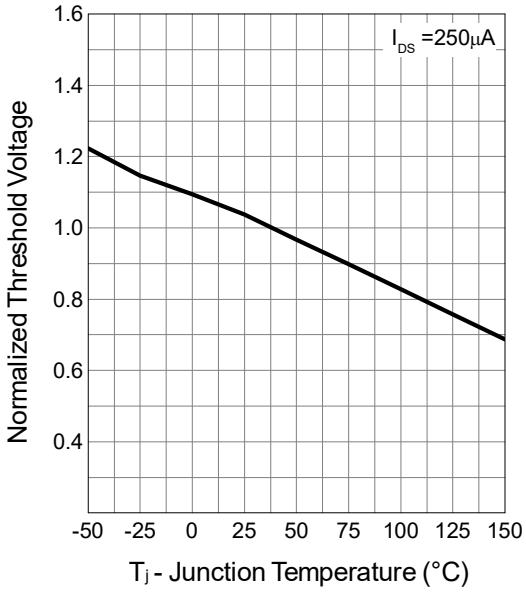
Drain-Source On Resistance

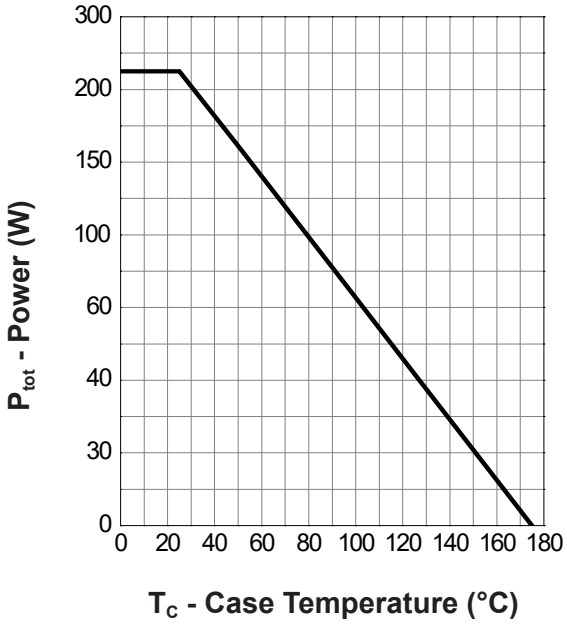


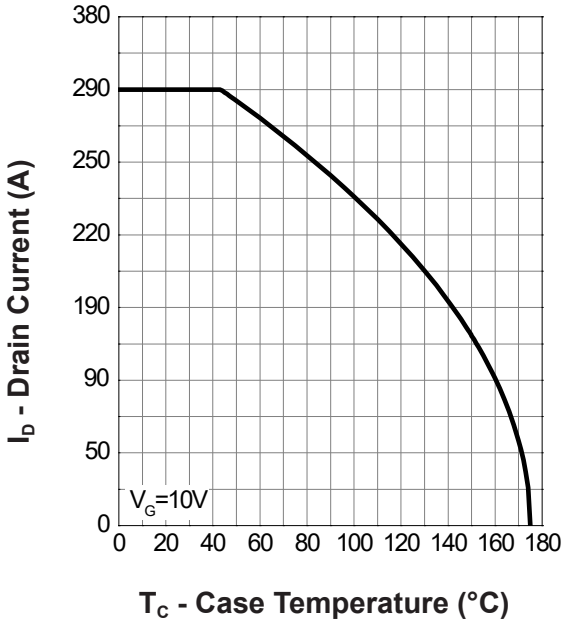
Gate-Source On Resistance

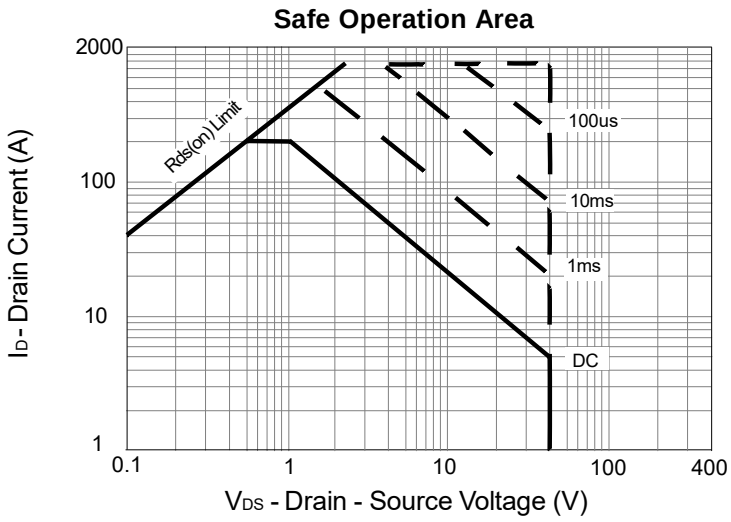


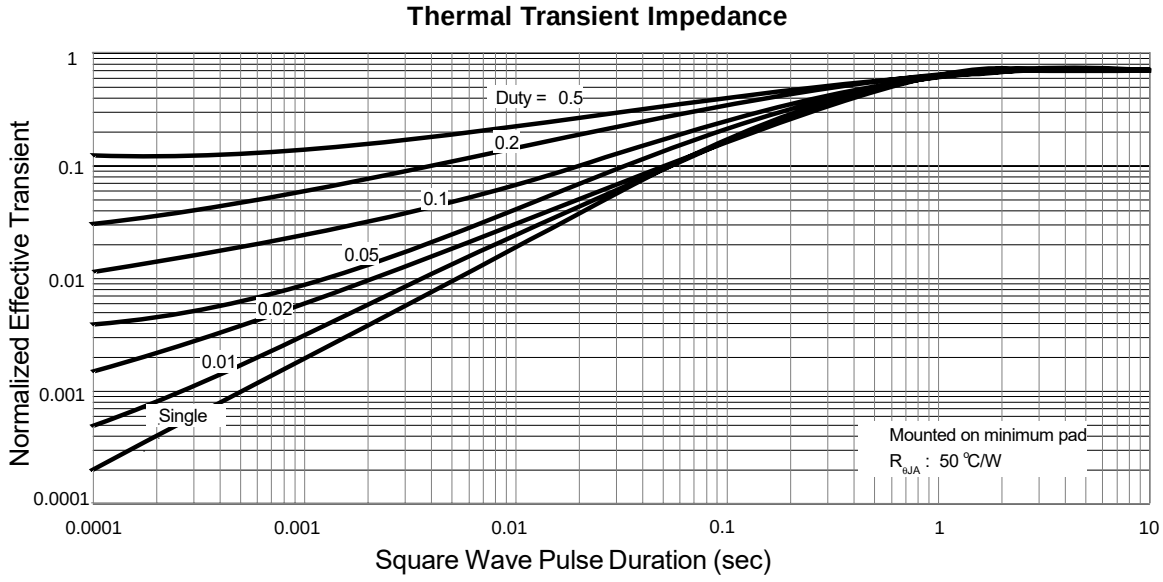
Gate Threshold Voltage



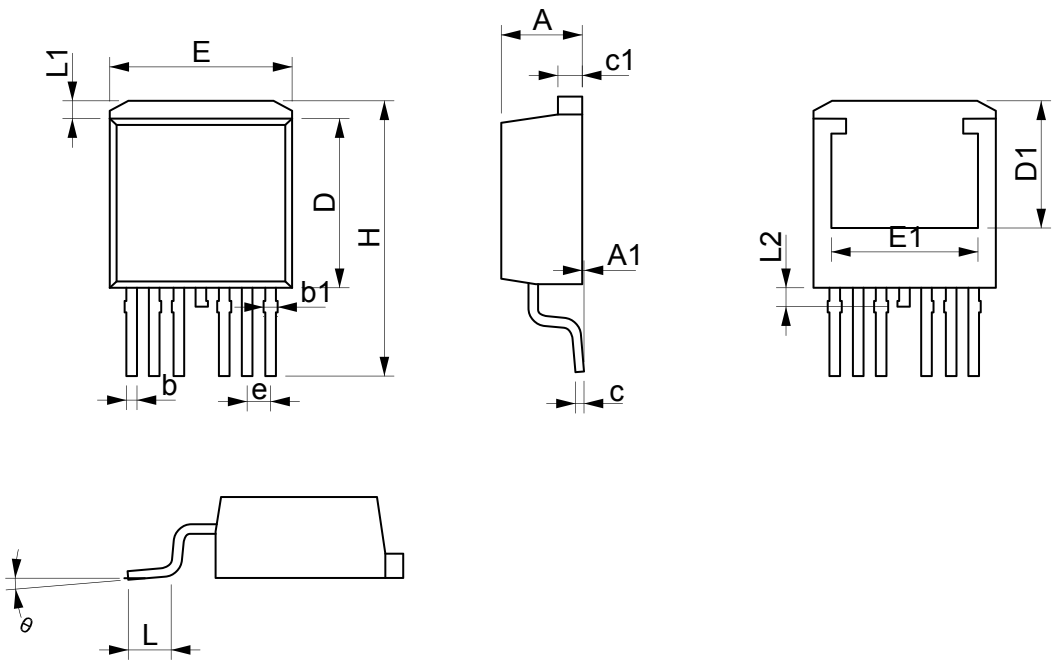

300
200
150
100
60
40
30
0
0 20 40 60 80 100 120 140 160 180
P_{tot} - Power (W)
T_C - Case Temperature (°C)


380
290
250
220
190
90
50
0
V_G=10V
0 20 40 60 80 100 120 140 160 180
I_D - Drain Current (A)
T_C - Case Temperature (°C)


Safe Operation Area
2000
100
10
1
0.1
1
10
100
400
Rds(on) Limit
100us
10ms
1ms
DC
I_D- Drain Current (A)
V_{DS} - Drain - Source Voltage (V)


Thermal Transient Impedance
1
0.1
0.01
0.001
0.0001
0.0001
0.001
0.01
0.1
1
10
Duty = 0.5
0.2
0.1
0.05
0.02
0.01
Single
Mounted on minimum pad
$R_{\theta JA}$: 50 °C/W
Normalized Effective Transient
Square Wave Pulse Duration (sec)

Packaging information



SYMBOLS	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.55	0.167	0.179
A1	0.01	0.25	0.000	0.010
b	0.50	0.70	0.020	0.028
b1	0.60	0.84	0.024	0.033
c	0.40	0.60	0.016	0.024
c1	1.20	1.40	0.047	0.055
D	9.05	9.45	0.356	0.372
D1	6.90	9.00	0.272	0.354
E	9.80	10.20	0.386	0.402
E1	7.25	9.00	0.285	0.354
e	1.27 BSC		0.05BSC	
H	14.65	15.35	0.577	0.604
L	2.40	3.00	0.094	0.118
L1	0.80	1.20	0.031	0.047
L2	0.85	1.15	0.33	0.045
θ	2°	8°	2°	8°

Attention

1, Any and all Winsok power products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your Winsok power representative nearest you before using any Winsok power products described or contained herein in such applications.

2,Winsok power assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all Winsok power products described or contained herein.

3, Specifications of any and all Winsok power products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.

4, Winsok power Semiconductor CO., LTD. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.

5,In the event that any or all Winsok power products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.

7, Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. Winsok power believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

8, Any and all information described or contained herein are subject to change without notice due to product/technology improvement,etc. When designing equipment, refer to the "Delivery Specification" for the Winsok power product that you Intend to use.

9, this catalog provides information as of Sep.2014. Specifications and information herein are subject to change without notice.