QIAOXIN N-Channel Super Trench II Power MOSFET

Description

The series of devices uses **Super Trench II** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g. This device is ideal for high-frequency switching and synchronous rectification.

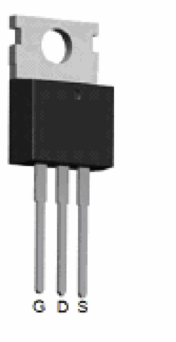
Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

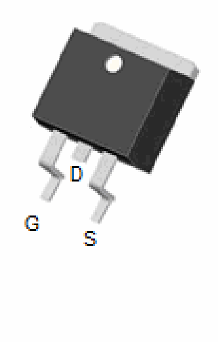
General Features

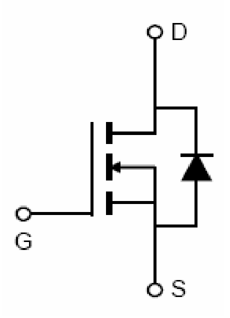
- V_{DS} =100V,I_D =110A
  $R_{DS(ON)}$=5.4mΩ , typical (TO-220)@ V_{GS}=10V
  $R_{DS(ON)}$=5.2mΩ , typical (TO-263)@ V_{GS}=10V
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 175 °C operating temperature
- Pb-free lead plating

TO-220



TO-263





Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VCRR055N10	VCRR055N10	TO-220	-	-	-
VCRR055N10D	VCRR055N10D	TO-263	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	110	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	72	A
Pulsed Drain Current	I_{DM}	440	A
Maximum Power Dissipation	P_D	150	W
Derating factor		1.0	W/℃
Single pulse avalanche energy (Note 5)	E_{AS}	680	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case (Note 2)	$R_{\theta JC}$	1.0	℃/W

Electrical Characteristics (T_C=25℃unless otherwise noted)

Parameter	Symbol	Condition		Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA		100		-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=100V,V_{GS}=0V		-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V		-	-	±100	nA
On Characteristics (Note 3)							
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA		2.0	3.0	4.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=55A	TO-220	-	5.4	5.7	mΩ
			TO-263		5.2	5.7	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=55A			60	-	S
Dynamic Characteristics (Note4)							
Input Capacitance	C_{iss}	V_{DS}=50V,V_{GS}=0V, F=1.0MHz		-	3850	-	PF
Output Capacitance	C_{oss}			-	410	-	PF
Reverse Transfer Capacitance	C_{rss}			-	20	-	PF
Switching Characteristics (Note 4)							
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=50V,I_D=55A V_{GS}=10V,R_G=1.6Ω		-	21	-	nS
Turn-on Rise Time	t_r			-	61	-	nS
Turn-Off Delay Time	$t_{d(off)}$			-	40	-	nS
Turn-Off Fall Time	t_f			-	12	-	nS
Total Gate Charge	Q_g	V_{DS}=50V,I_D=55A, V_{GS}=10V		-	72	-	nC
Gate-Source Charge	Q_{gs}			-	21		nC
Gate-Drain Charge	Q_{gd}			-	22		nC
Drain-Source Diode Characteristics							
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=50A		-		1.2	V
Diode Forward Current (Note 2)	I_S			-	-	100	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F = I_S di/dt = 100A/μs (Note3)		-	67	-	nS
Reverse Recovery Charge	Qrr			-	137	-	nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition : Tj=25℃,V_{DD}=50V,V_G=10V,L=0.5mH,Rg=25Ω

Typical Electrical and Thermal Characteristics

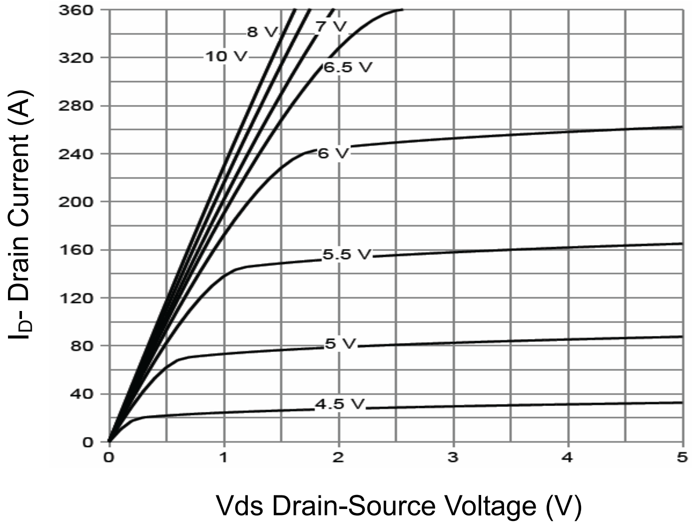


Figure 1 Output Characteristics

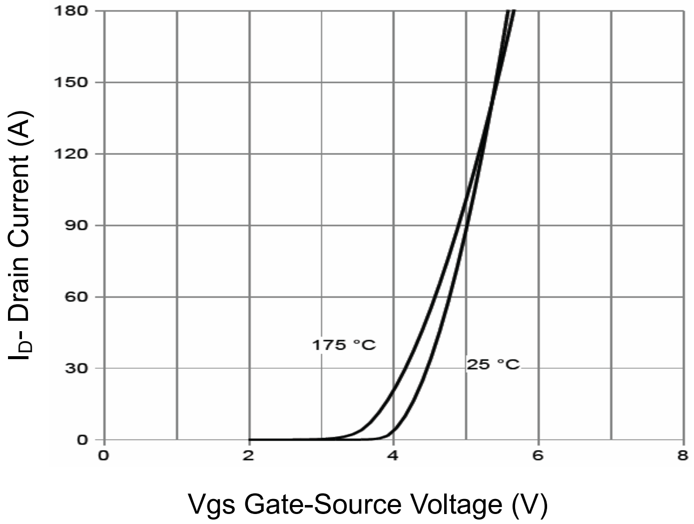


Figure 2 Transfer Characteristics

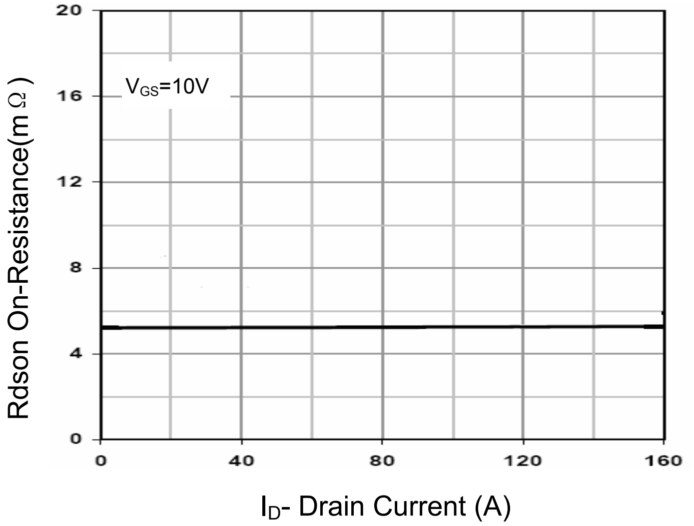


Figure 3 Rdson- Drain Current

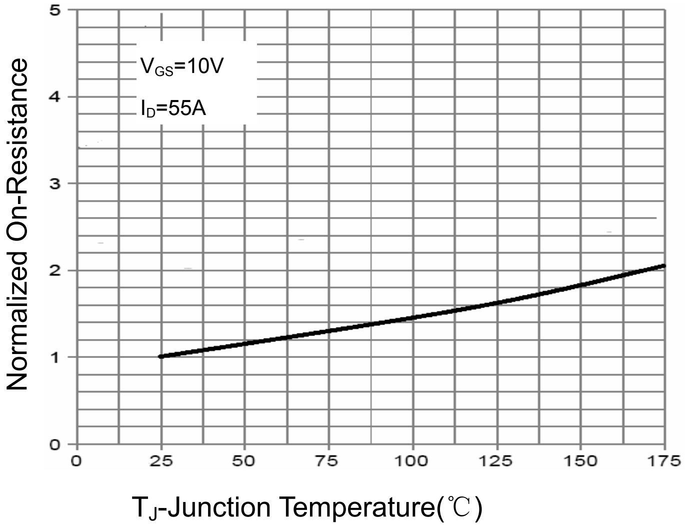


Figure 4 Rdson-Junction Temperature

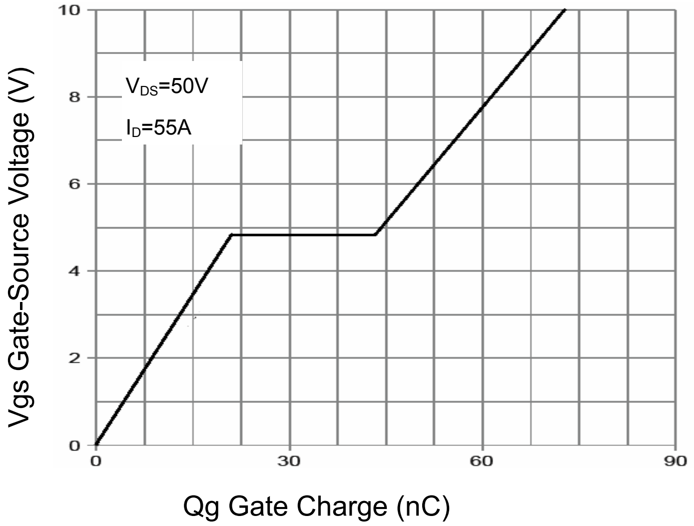


Figure 5 Gate Charge

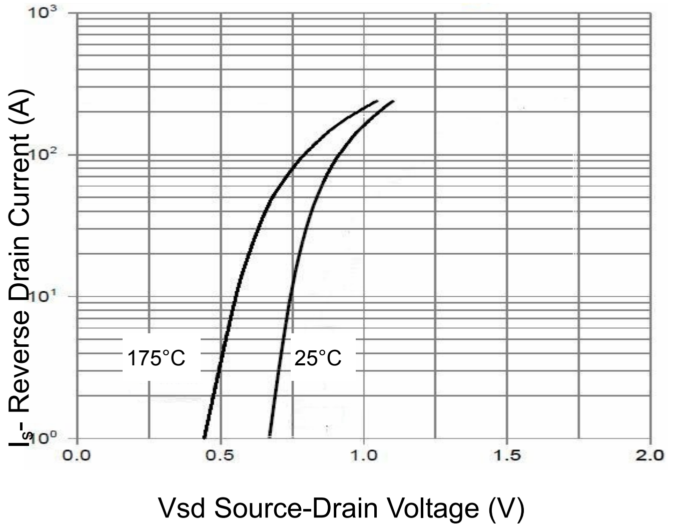


Figure 6 Source- Drain Diode Forward

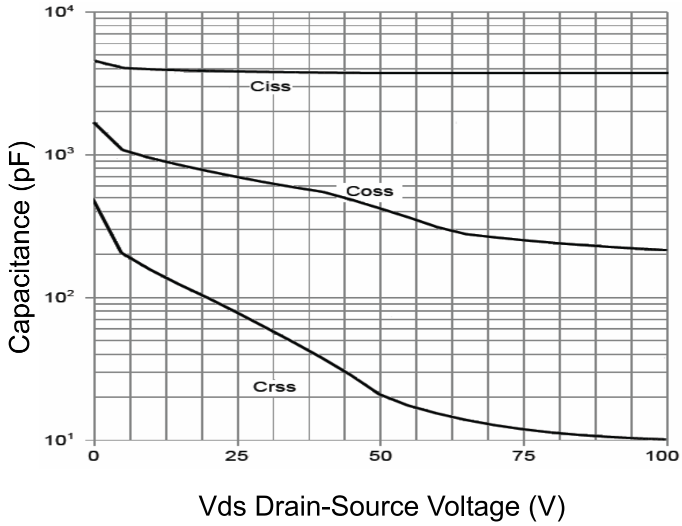


Figure 7 Capacitance vs Vds

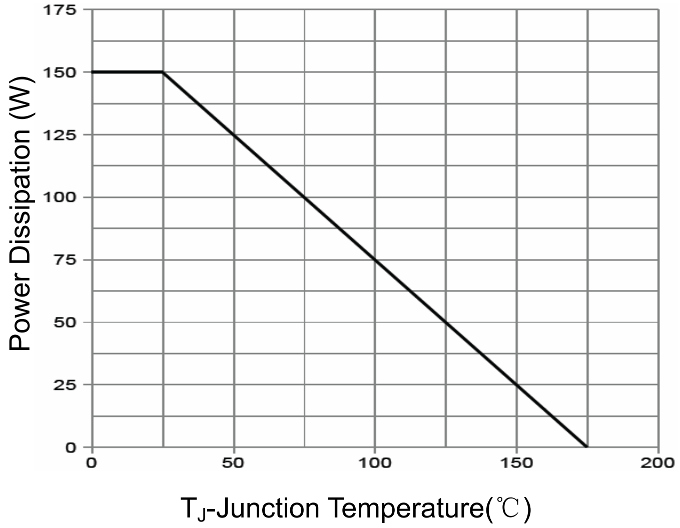


Figure 9 Power De-rating

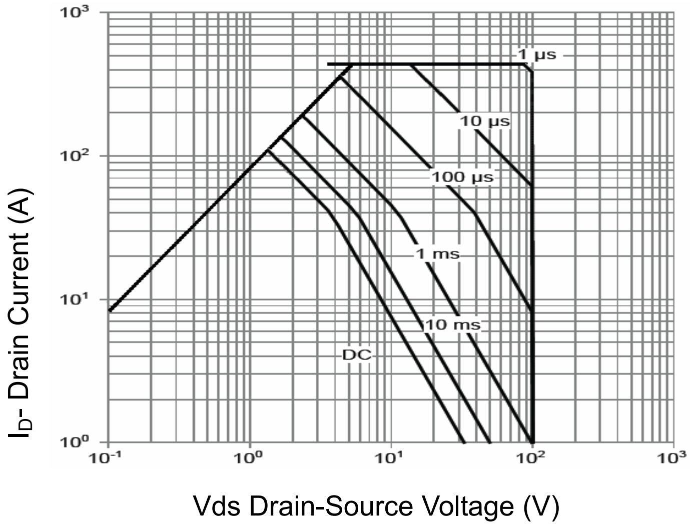


Figure 8 Safe Operation Area

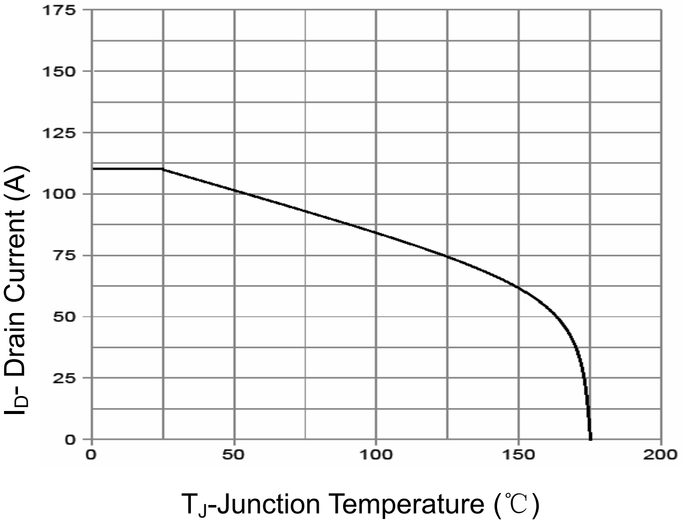


Figure 10 Current De-rating

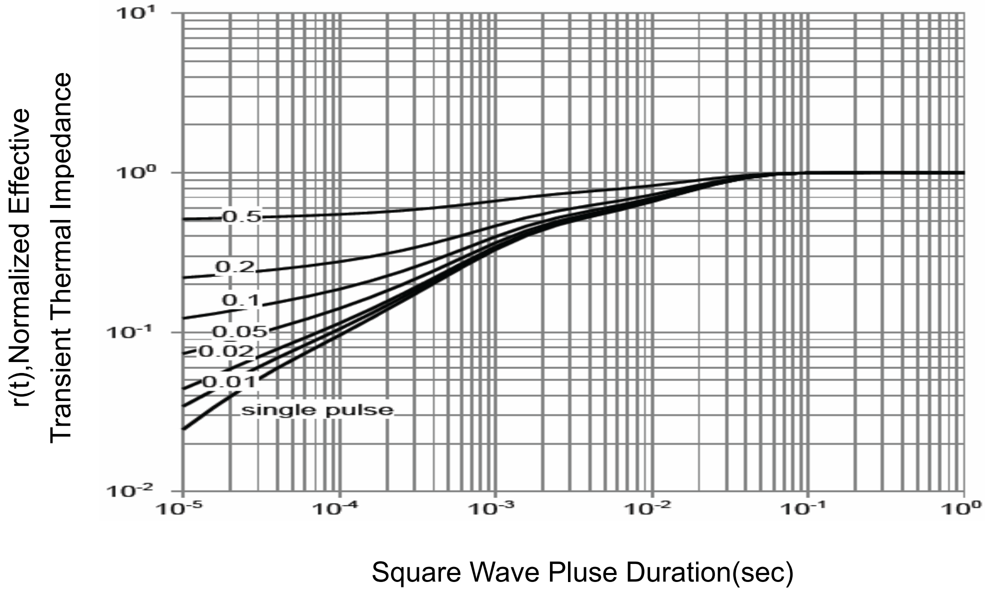
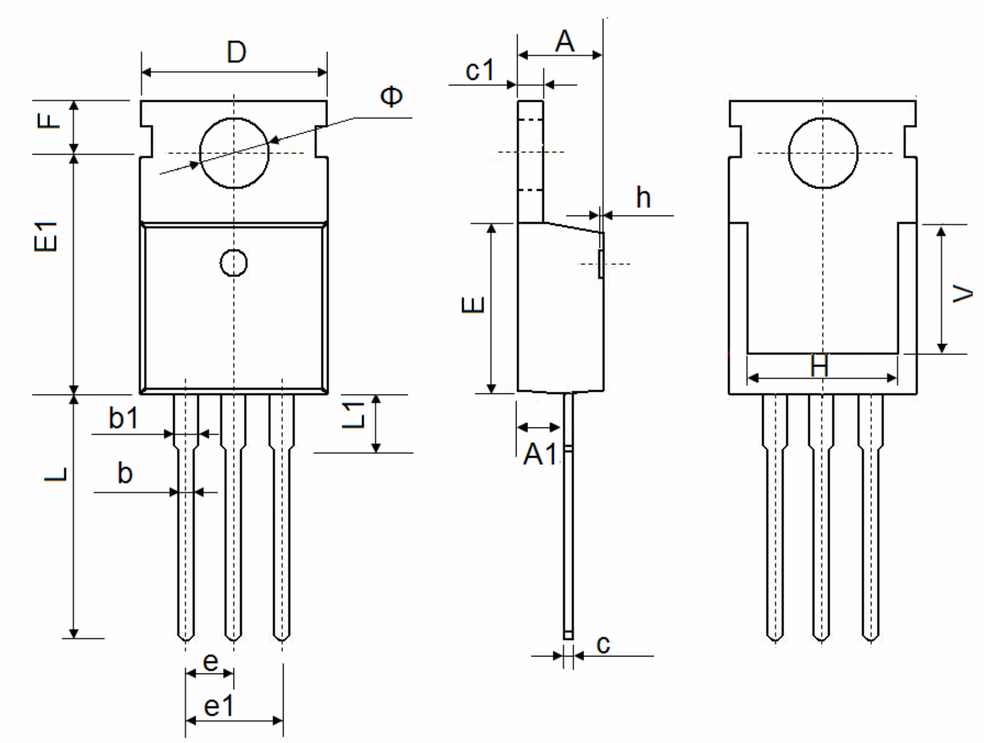


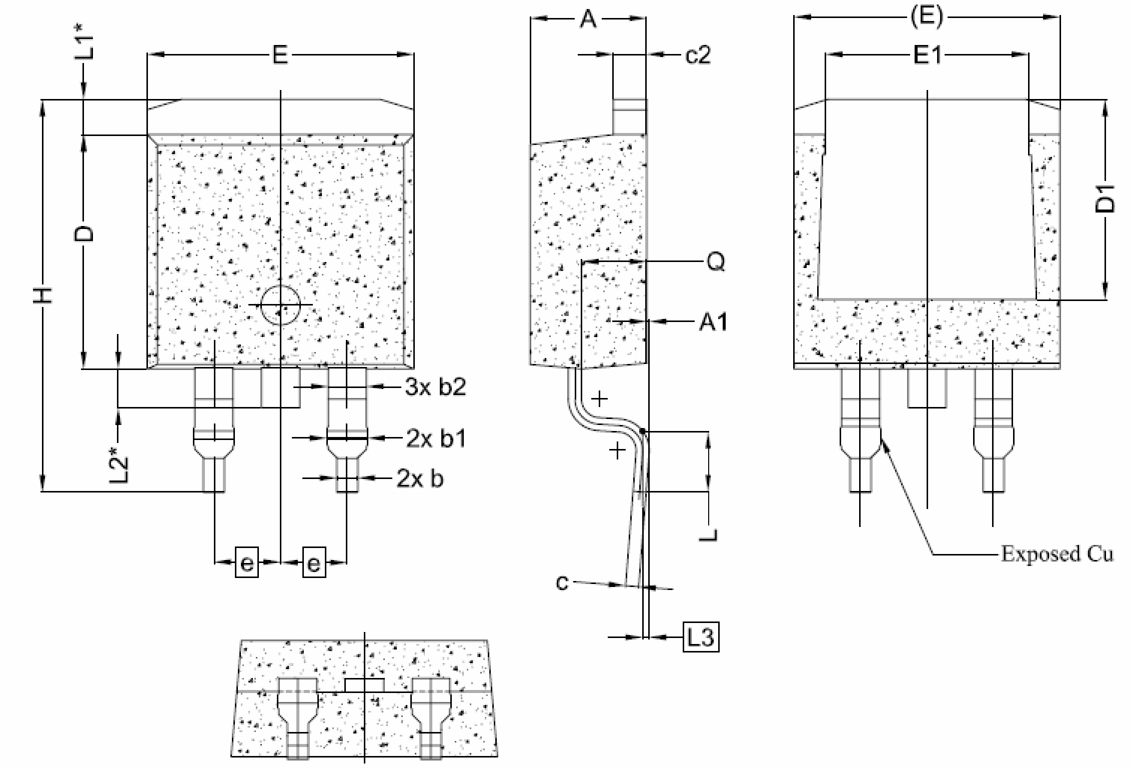
Figure 11 Normalized Maximum Transient Thermal Impedance

TO-220-3L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.9500	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	6.900 REF.		0.276 REF.	
Φ	3.400	3.800	0.134	0.150

TO-263-2L Package Information



Symbol	Dimensions In Millimeters		
	Min.	Nom.	Max.
A	4.24	4.44	4.64
A1	0.00	0.10	0.25
b	0.70	0.80	0.90
b1	1.20	1.55	1.75
b2	1.20	1.45	1.70
c	0.40	0.50	0.60
c2	1.15	1.27	1.40
D	8.82	8.92	9.02
D1	6.86	7.65	-
E	9.96	10.16	10.36
E1	6.89	7.77	7.89
e	2.54BSC		
H	14.61	15.00	15.88
L	1.78	2.32	2.79
L1	1.36 REF.		
L2	1.50 REF.		
L3	0.25 BSC		
Q	2.30	2.48	2.70

Attention