
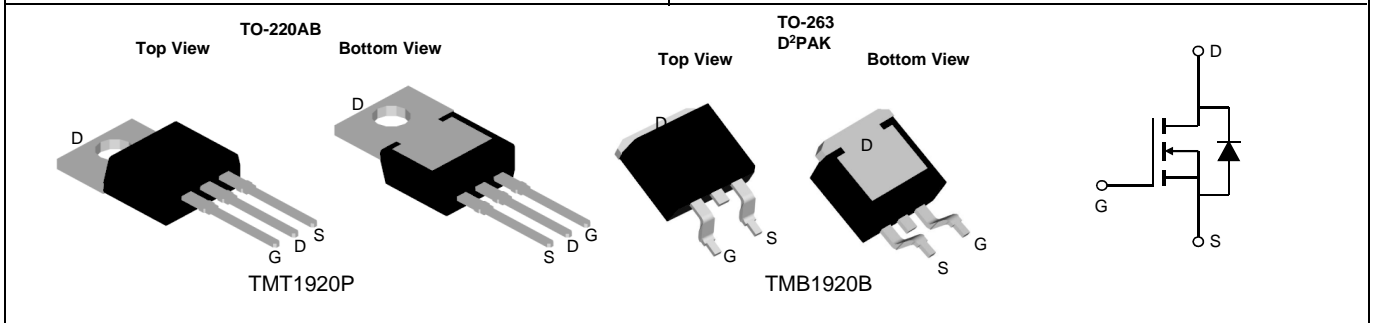


**TMT1920P / TMB1920B**  
**N-CHANNEL POWER MOSFET**

<p><b>General Description</b></p> <ul style="list-style-type: none"> <li>Power Management for Inverter Systems</li> </ul>	<p><b>Product Summary</b></p> <ul style="list-style-type: none"> <li>200V/90A</li> <li><math>R_{DS(ON)} = 22m\Omega(\text{typ.}) @ V_{GS} = 10V</math></li> <li>Reliable and Rugged</li> <li>Lead Free and Green Devices Available (RoHS Compliant)</li> </ul> <p>100% UIS Tested 100% <math>R_g</math> Tested</p> 
---	--



**Absolute Maximum Ratings**

Symbol	Parameter	Rating	Unit
<b>Common Ratings (Tc=25°C Unless Otherwise Noted)</b>			
V <sub>DSS</sub>	Drain-Source Voltage	200	V
V <sub>GSS</sub>	Gate-Source Voltage	±20	V
T <sub>J</sub>	Maximum Junction Temperature	175	°C
T <sub>STG</sub>	Storage Temperature Range	-55 to 175	°C
I <sub>S</sub>	Source Current-Continuous(Body Diode)	Tc=25°C 90	A
<b>Mounted on Large Heat Sink</b>			
I <sub>DM</sub>	Pulsed Drain Current *	Tc=25°C 360	A
I <sub>D</sub>	Continuous Drain Current	Tc=25°C 90	A
		Tc=100°C 70	A
P <sub>D</sub>	Maximum Power Dissipation	Tc=25°C 375	W
		Tc=100°C 187.5	W
R <sub>θJC</sub>	Thermal Resistance, Junction-to-Case	0.4	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient **	62.5	°C/W
E <sub>AS</sub>	Single Pulsed-Avalanche Energy ***	L=0.5mH 784	mJ

Note: \* Repetitive rating; pulse width limited by max. junction temperature.  
 \*\* Surface mounted on FR-4 board.  
 \*\*\* Limited by T<sub>Jmax</sub>, starting T<sub>J</sub>=25°C, L = 0.5mH, R<sub>G</sub>= 25Ω, V<sub>GS</sub> =10V.

## Electrical Characteristics (T<sub>c</sub> =25°C Unless Otherwise Noted)

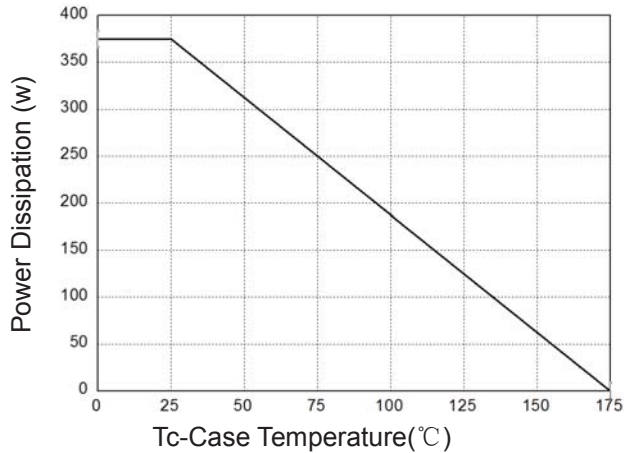
Symbol	Parameter	Test Conditions	1920			Unit
			Min	Typ.	Max	
<b>Static Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA	200	-		V
I <sub>DSS</sub>	Drain-to-Source Leakage Current	V <sub>DS</sub> =200V, V <sub>GS</sub> =0V	-	-	1	μA
		T <sub>J</sub> =55°C	-	-	5	μA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA	2.0	3.0	4.0	V
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
R <sub>DS(ON)*</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =10V, I <sub>DS</sub> =45A		22.0	24.0	mΩ
<b>Diode Characteristics</b>						
V <sub>SD*</sub>	Diode Forward Voltage	I <sub>SD</sub> =45A, V <sub>GS</sub> =0V	-	0.82	1.1	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>SD</sub> =45A, dI <sub>SD</sub> /dt=100A/μs	-	80	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge		-	160	-	nC

Symbol	Parameter	Test Conditions	1920			Unit
			Min	Typ.	Max	
<b>Dynamic Characteristics</b>						
R <sub>G</sub>	Gate Resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz	-	3.4	-	Ω
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, Frequency=1.0MHz	-	5871	-	pF
C <sub>oss</sub>	Output Capacitance		-	392	-	
C <sub>rss</sub>	Reverse Transfer Capacitance		-	165	-	
t <sub>d(ON)</sub>	Turn-on Delay Time	V <sub>DD</sub> =100V, R <sub>G</sub> =4Ω, I <sub>DS</sub> =45A, V <sub>GS</sub> =10V	-	29	-	ns
T <sub>r</sub>	Turn-on Rise Time		-	45	-	
t <sub>d(OFF)</sub>	Turn-off Delay Time		-	22	-	
T <sub>f</sub>	Turn-off Fall Time		-	41	-	
<b>Gate Charge Characteristics</b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =160V, V <sub>GS</sub> =10V, I <sub>D</sub> =45A	-	130.4	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	22.1	-	
Q <sub>gd</sub>	Gate-Drain Charge		-	38.2	-	

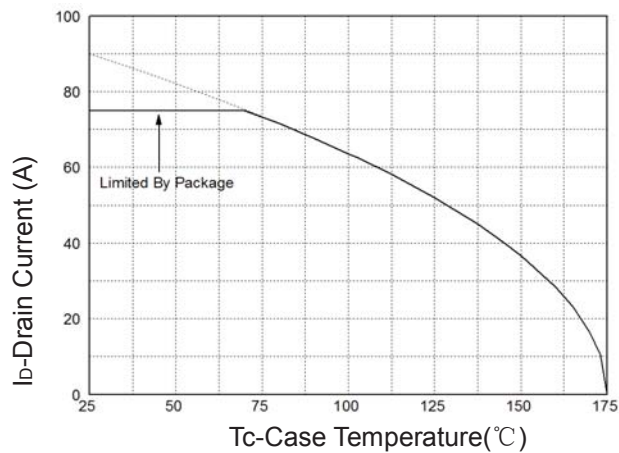
Note: \*Pulse test, pulse width ≤ 300us, duty cycle ≤ 2%

# Typical Operating Characteristics

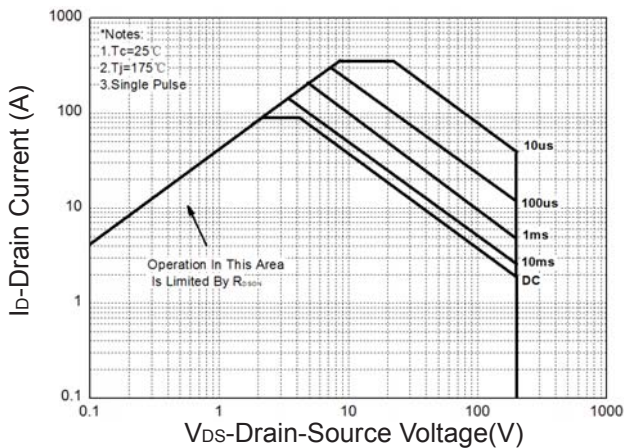
**Figure 1: Power Dissipation**



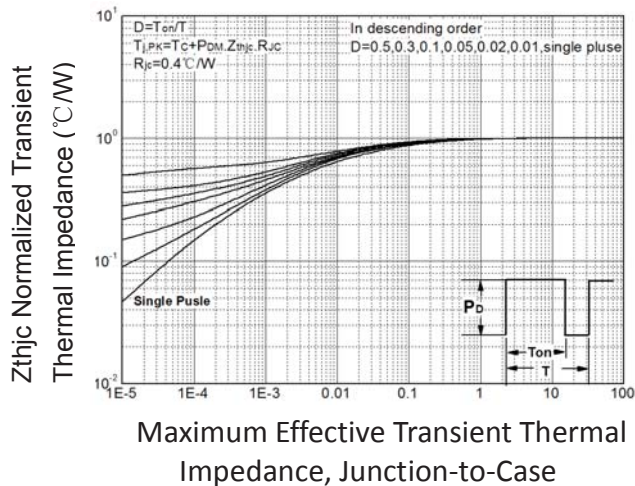
**Figure 2: Drain Current**



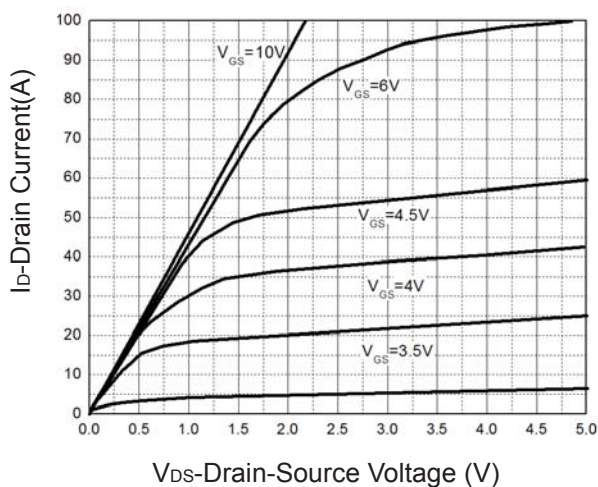
**Figure 3: Safe Operation Area**



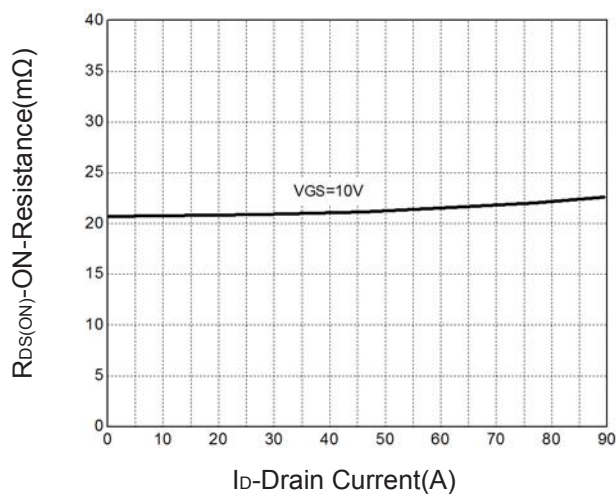
**Figure 4: Thermal Transient Impedance**



**Figure 5: Output Characteristics**



**Figure 6: Drain-Source On Resistance**



## Typical Operating Characteristics(Cont.)

Figure 7: Gate-Source Vs. On-Resistance

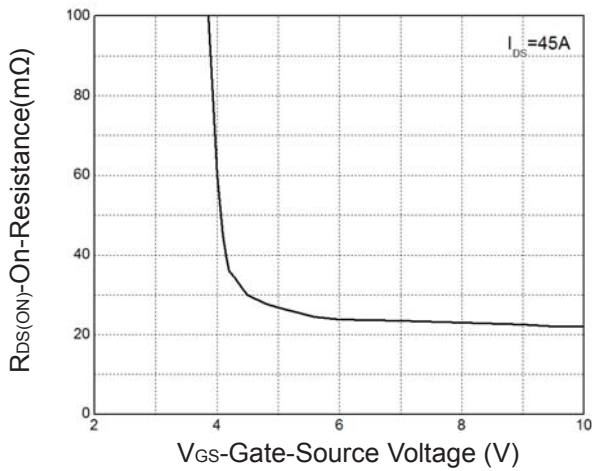


Figure 8: Gate-Source Forward

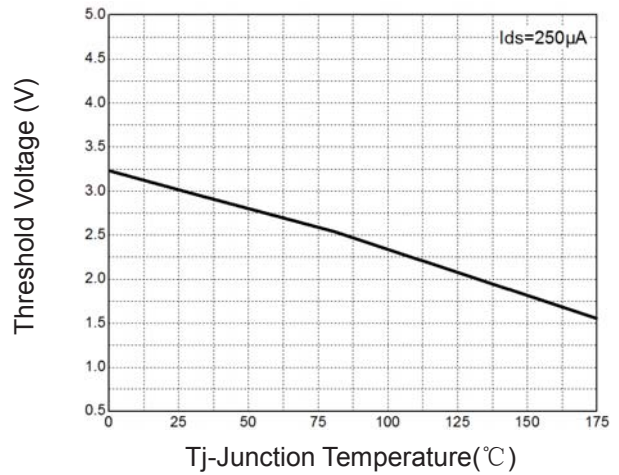


Figure 9: On-Resistance vs. Temperature

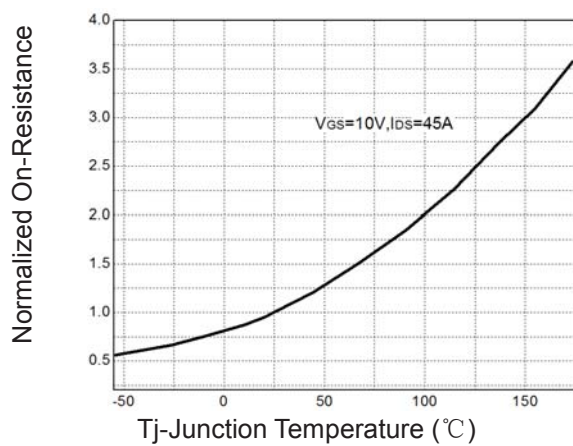


Figure 10: Source-Drain Diode Forward

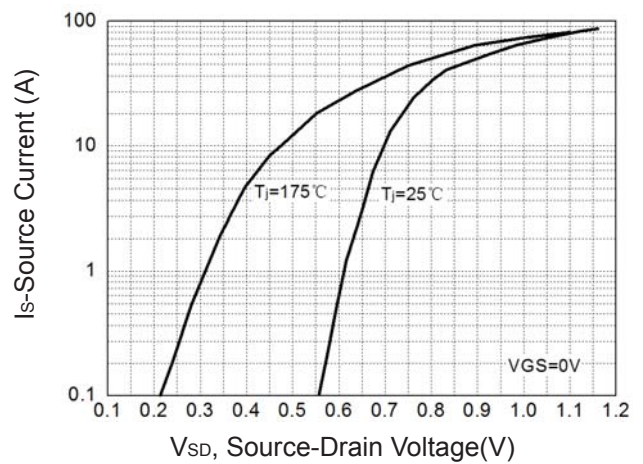


Figure 11: Capacitance Characteristics

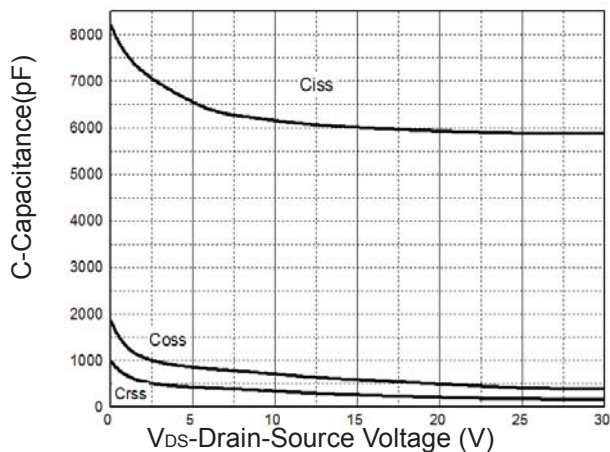
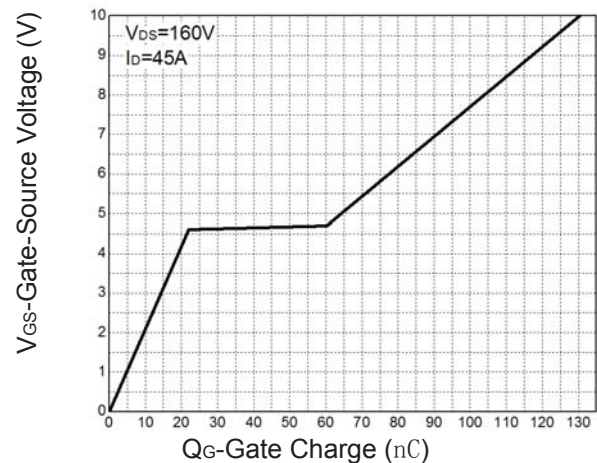
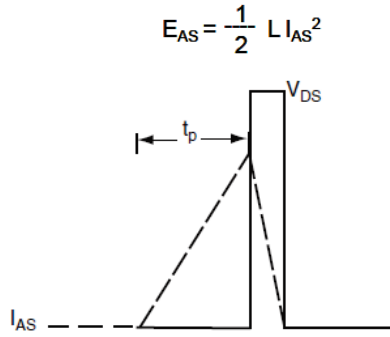
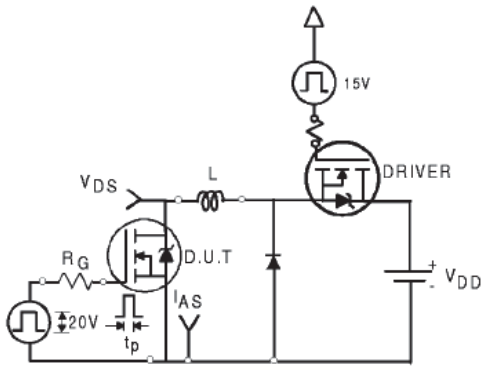


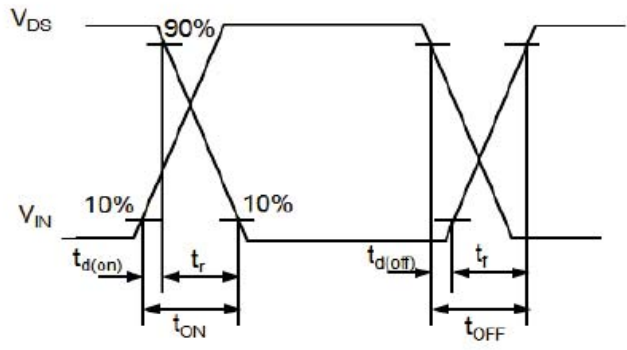
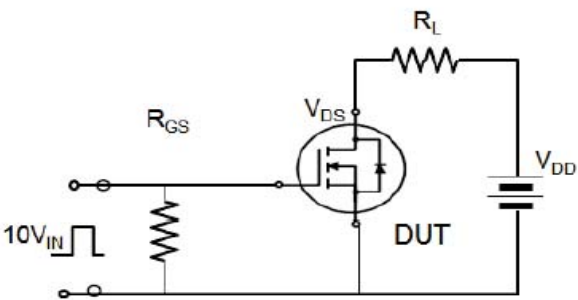
Figure 12: Gate Charge Characteristics



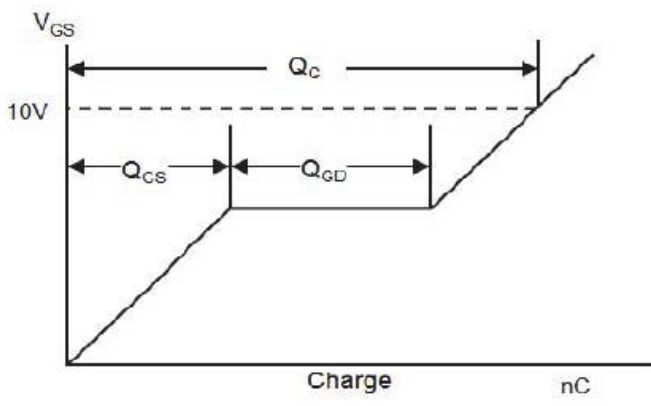
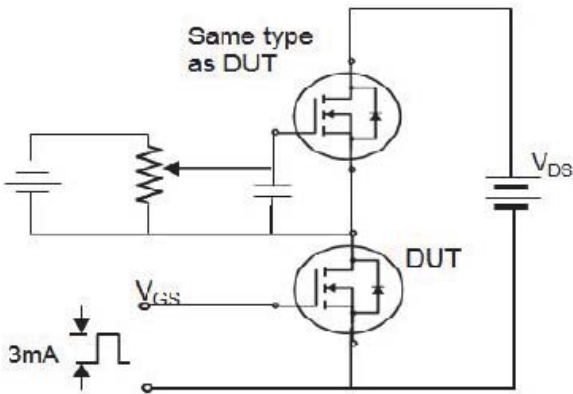
### Avalanche Test Circuit



### Switching Time Test Circuit

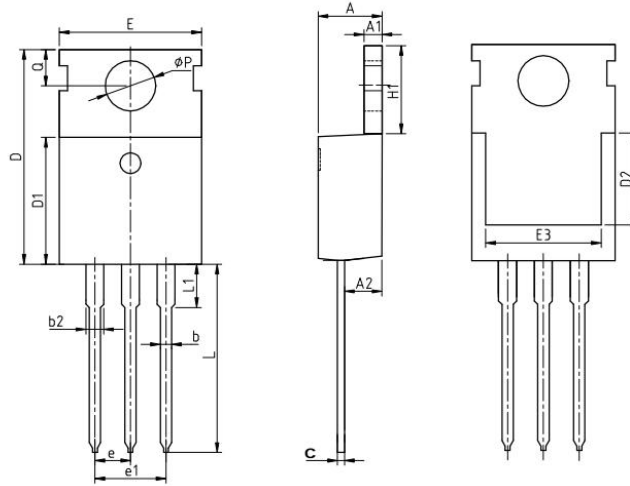


### Gate Charge Test Circuit



# Package Information

## TO-220AB

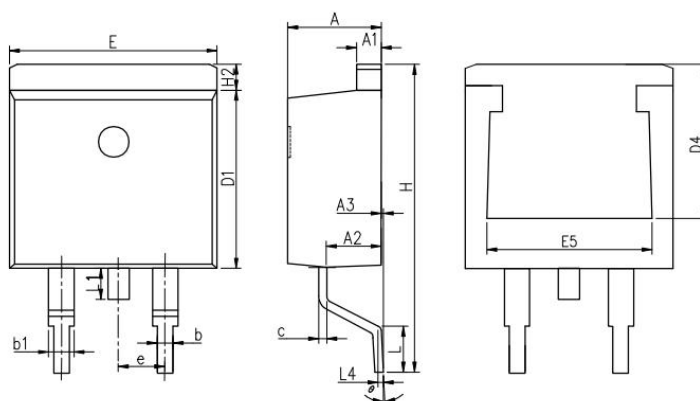


### COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.25	1.30	1.45
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b2	1.17	1.27	1.47
c	0.40	0.50	0.65
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.50	-	-
E	9.70	10.00	10.30
E3	7.00	-	-
e	2.54 BSC		
e1	5.08 BSC		
H1	6.25	6.50	6.85
L	12.75	13.50	13.80
L1	-	3.10	3.40
ΦP	3.40	3.60	3.80
Q	2.60	2.80	3.00

## Package Information

### TO-263



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.22	1.27	1.42
A2	2.49	2.69	2.89
A3	0	0.13	0.25
b	0.7	0.81	0.96
b1	1.17	1.27	1.47
c	0.3	0.38	0.53
D1	8.5	8.7	8.9
D4	6.6	-	-
E	9.86	10.16	10.36
E5	7.06	-	-
e	2.54 BSC		
H	14.7	15.1	15.5
H2	1.07	1.27	1.47
L	2	2.3	2.6
L1	1.4	1.55	1.7
L4	0.25 BSC		
θ	0°	5°	9°