

100V N-Channel Enhancement Mode MOSFET

Description

The AP140N10F/P/T uses advanced **APM-SGT I I** technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 10V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS} = 100V$ $I_D = 140A$

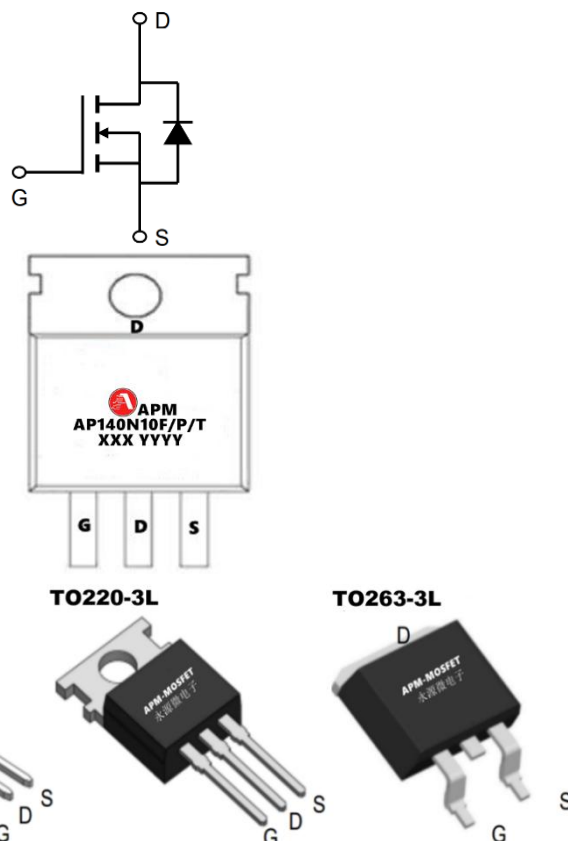
$R_{DS(ON)} < 5.5m\Omega$ @ $V_{GS}=10V$ (Type: **4.6m Ω**)

Application

DC/DC Converter

LED Backlighting

Power Management Switches



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP140N10F	TO220F-3L	AP140N10F XXX YYYY	1000
AP140N10P	TO220-3L	AP140N10P XXX YYYY	1000
AP140N10T	TO263-3L	AP140N10T XXX YYYY	800

Absolute Maximum Ratings ($T_C=25^{\circ}C$ unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^{\circ}C$	Continuous Drain Current, V_{GS} @ 10V	140	A
$I_D@T_C=100^{\circ}C$	Continuous Drain Current, V_{GS} @ 10V	85	A
IDM	Pulsed Drain Current	417	A
EAS	Single Pulse Avalanche Energy	245	mJ
IAS	Avalanche Current	42	A
$P_D@T_C=25^{\circ}C$	Total Power Dissipation ⁴	167	W
TSTG	Storage Temperature Range	-55 to 150	$^{\circ}C$
T_J	Operating Junction Temperature Range	-55 to 150	$^{\circ}C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	0.88	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case	62	$^{\circ}C/W$

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Electrical Characteristics ($T_c=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
VDSS	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	100	-	-	V
IGSS	Gate-body Leakage current	$V_{DS} = 0V, V_{GS} = \pm 20V$	-	-	± 100	nA
IDSS	Zero Gate Voltage Drain Current $T_J=25^{\circ}\text{C}$	$V_{DS} = 100V, V_{GS} = 0V$	-	-	1	μA
IDSS	Zero Gate Voltage Drain Current $T_J=100^{\circ}\text{C}$		-	-	100	
VGS(th)	Gate-Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	2.9	4.0	V
RDS(on)	Drain-Source on-Resistance ²	$V_{GS} = 10V, I_D = 20A$	-	4.2	6	m Ω
Ciss	Input Capacitance	$V_{DS} = 50V, V_{GS} = 0V, f = 1MHz$	-	2816	-	pF
Coss	Output Capacitance		-	614	-	
Crss	Reverse Transfer Capacitance		-	7.4	-	
Rg	Gate Resistance	$V_{GS} = 0V, V_{DS} = 0V, f = 1MHz$	-	2.4	-	Ω
Qg	Total Gate Charge	$V_{GS} = 10V, V_{DS} = 50V, I_D = 20A$	-	42	-	nC
Qgs	Gate-Source Charge		-	9.7	-	
Qgd	Gate-Drain Charge		-	10.6	-	
td(on)	Turn-on Delay Time	$V_{GS} = 10V, V_{DS} = 50V, R_G = 3\Omega, I_D = 20A$	-	13	-	ns
tr	Rise Time		-	25	-	
td(off)	Turn-off Delay Time		-	43	-	
tf	Fall Time		-	37	-	
VSD	Diode Forward Voltage ²	$I_F = 20A, V_{GS} = 0V$	-	-	1.2	V
IS	Continuous Source Current ^{1,5}	$V_G = V_D = 0V$, Force Current	-	-	167	A
trr	Body Diode Reverse Recovery Time	$I_F = 20A, dI/dt = 100A/\mu s$	-	60	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	61	-	nC

Notes:

- 1、The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2、The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3、The EAS data shows Max. rating . The test condition is $V_{DD}=50V, V_{GS}=10V, L=0.4mH, I_{AS}=42A$
- 4、The power dissipation is limited by 150°C junction temperature
- 5、The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

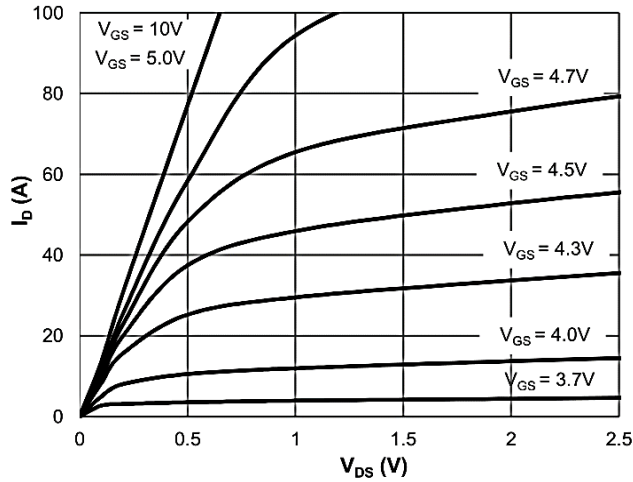


Figure 1: Saturation Characteristics

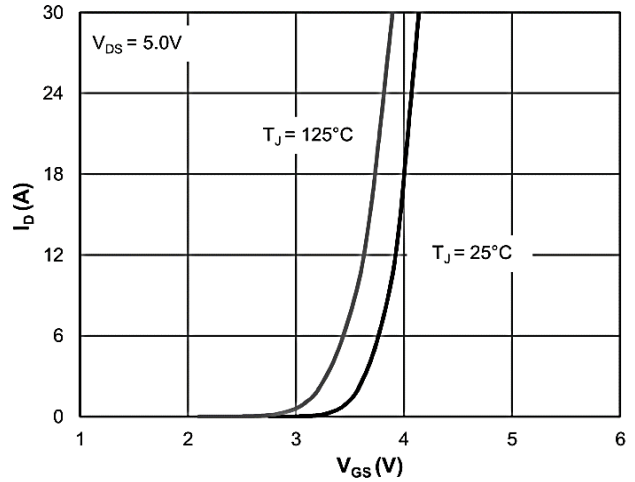


Figure 2: Transfer Characteristics

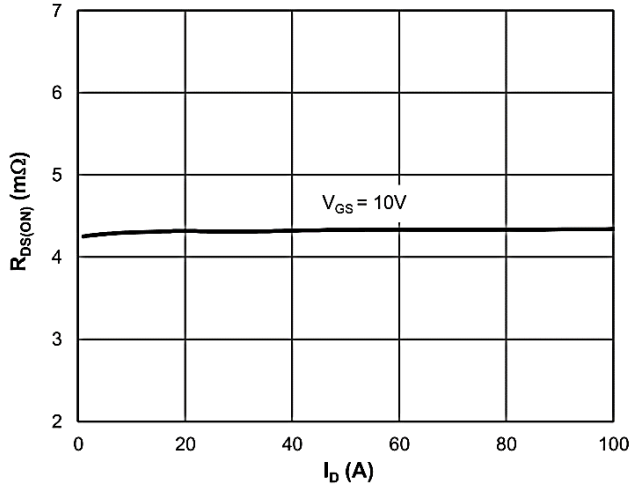


Figure 3: $R_{DS(ON)}$ vs. Drain Current

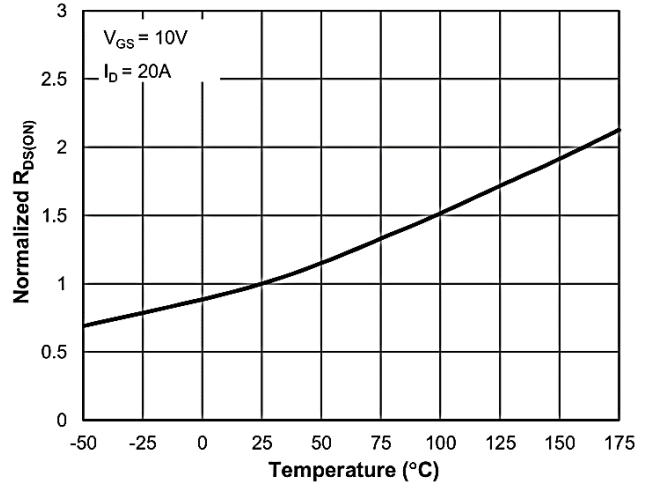


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

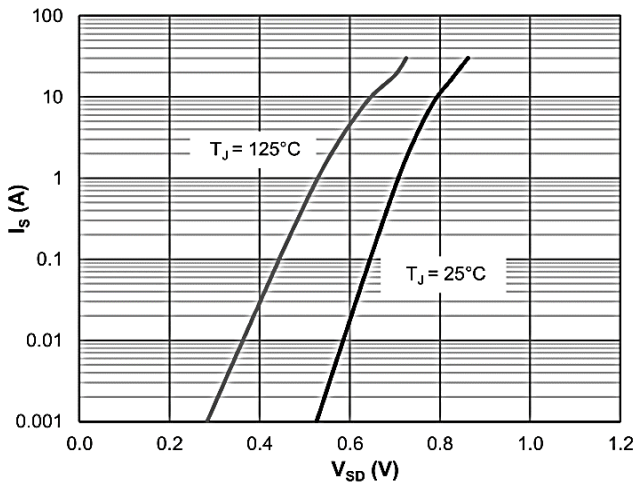


Figure 5: Body-Diode Characteristics

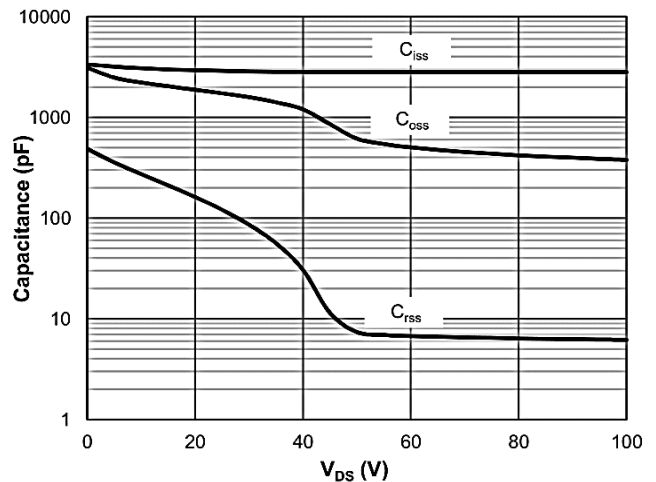


Figure 6: Capacitance Characteristics

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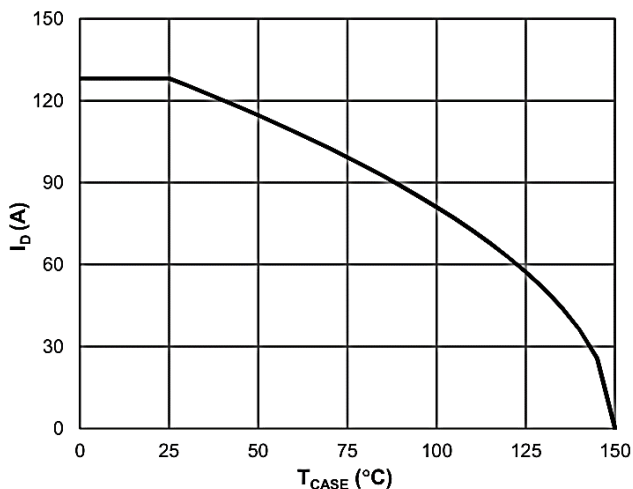


Figure 7: Current De-rating

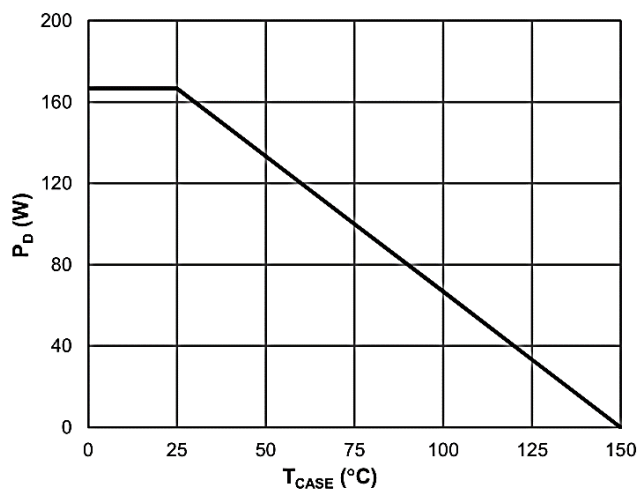


Figure 8: Power De-rating

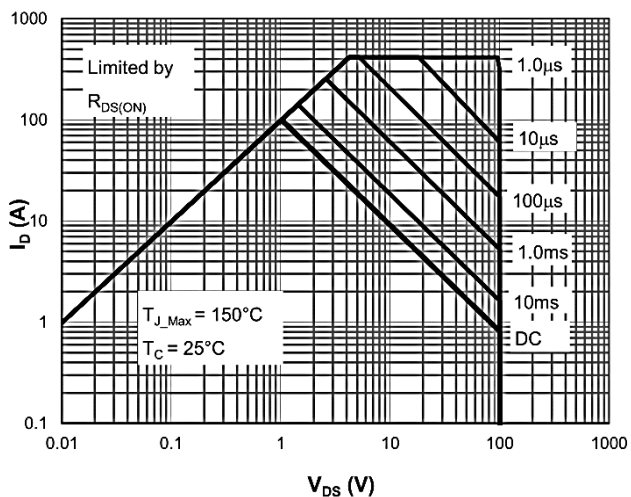


Figure 9: Maximum Safe Operating Area

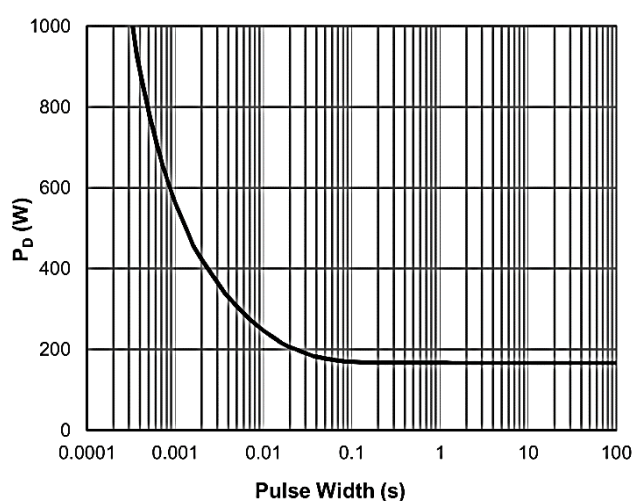


Figure 10: Single Pulse Power Rating, Junction-to-Case

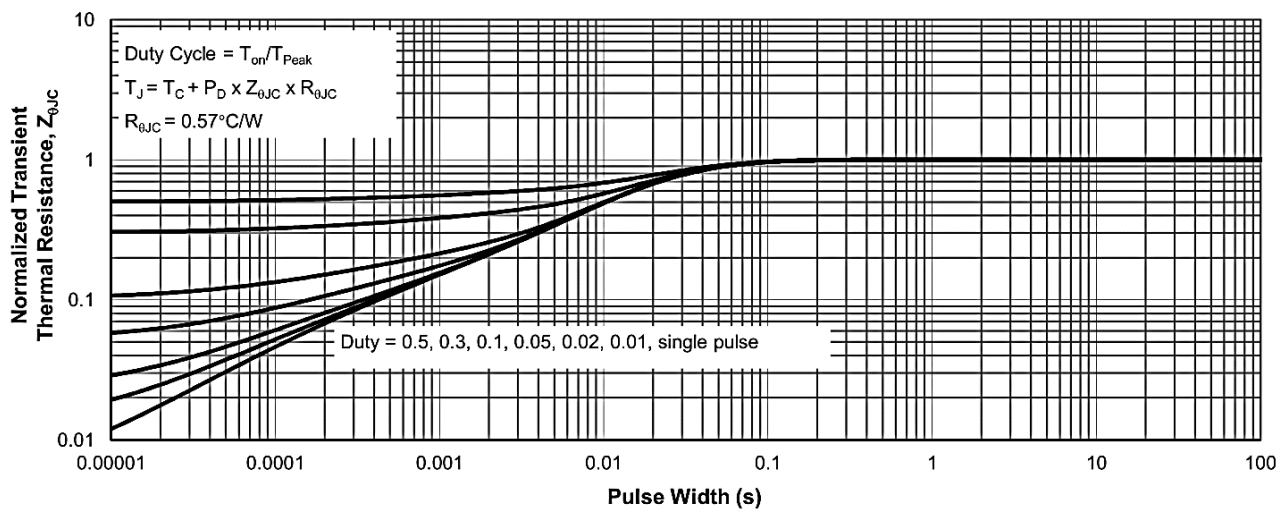
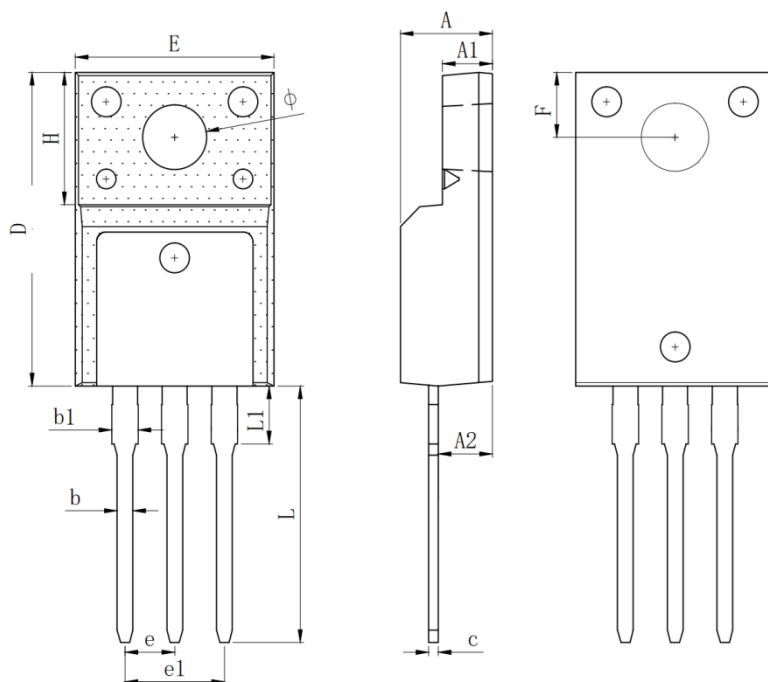


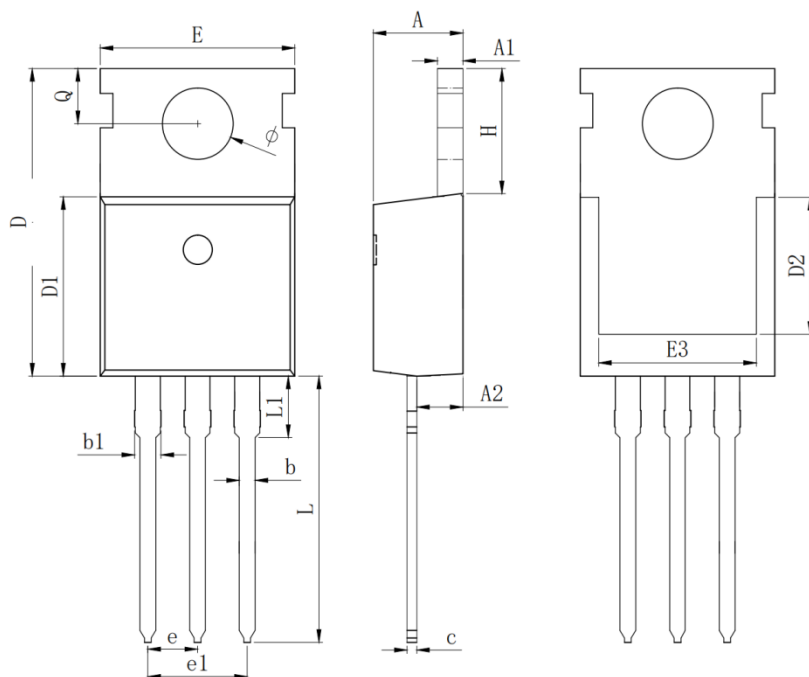
Figure 11: Normalized Maximum Transient Thermal Impedance

Package Mechanical Data-TO220F-3L



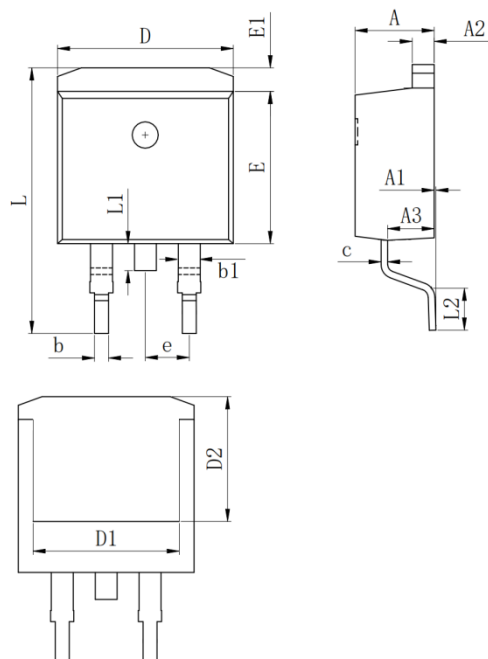
Symbol	Dimensions In Millimeters		
	min.	typ.	max.
A	4.50	4.70	5.00
A1	2.34	2.54	2.84
A2	2.40	2.90	3.40
b	0.70	0.80	0.95
b1	1.05	1.35	1.55
c	0.40	0.50	0.65
D	15.57	15.87	16.17
H	6.70REF		
E	9.86	10.16	10.46
e	2.54BSC		
e1	5.08BSC		
L	12.65	12.98	13.30
L1	2.78	3.08	3.38
F	3.15	3.30	3.55
φ	3.00	3.30	3.65

Package Mechanical Data-TO220-3L



Symbol	Dimensions In Millimeters		
	min.	typ.	max.
A	4.25	4.50	4.70
A1	1.15	1.30	1.45
A2	2.15	2.35	2.55
b	0.65	0.80	0.95
b1	1.15	1.35	1.55
c	0.35	0.50	0.65
D	14.30	15.30	16.30
D1	8.80	9.10	9.40
D2	6.3REF		
E	9.70	10.00	10.30
E3	7.00	8.00	9.0
e	2.54BSC		
e1	5.08BSC		
L	12.70	13.50	13.90
L1	2.60	3.10	3.40
H	6.00	6.50	6.85
Q	2.60	2.80	3.00
φ	3.40	3.60	3.80

Package Mechanical Data-TO263-3L



Symbol	Dimensions In Millimeters		
	min.	typ.	max.
A	4.37	4.57	4.77
A1	0.00		0.25
A2	1.22	1.27	1.42
A3	2.49	2.69	2.89
b	0.70	0.81	0.96
b1	1.17	1.27	1.47
c	0.30	0.38	0.53
D	9.86	10.16	10.40
D1	8.4REF		
D2	7.073REF		
E	8.50	8.70	9.30
E1	0.87	1.17	1.47
e	2.54BSC		
L	14.70	15.10	15.50
L1	1.40	1.55	1.70
L2	2.00	2.30	2.60



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Edition	Date	Change
REV1.0	2022/8/5	Initial release
REV1.1	2024/9/10	Add Pack “TO-220F”

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