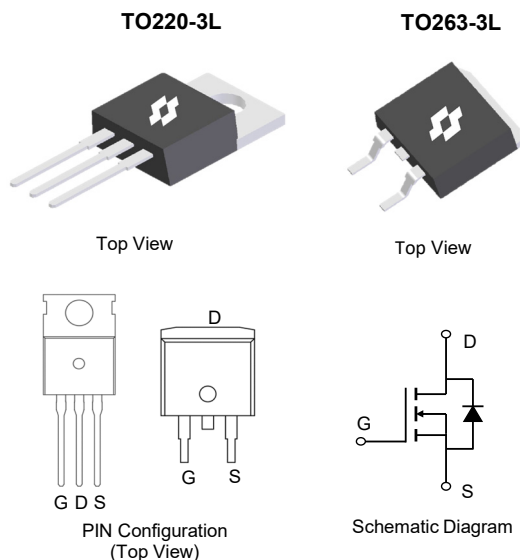


Product Summary

V_{DS}	$R_{DS(ON_TYP)}$		I_{D_MAX}
120 V	3.0 m Ω	@ $V_{GS} = 10V$	189 A
	3.3 m Ω	@ $V_{GS} = 10V$	

Features

- Low On-Resistance
- Excellent FoM (figure of merit)
- 100% ΔV_{DS} & UIS & R_g Tested


Applications

- Motor controls
- DC/DC in Telecoms and Industrial
- High frequency switching, synchronous rectification

Mechanical Data

- Green Molding Compound
- Moisture Sensitivity: Level 1 per J-STD-020
- UL Flammability Classification Rating 94V-0

Ordering Information

Orderable Part Number	Package Type	Device Marking	Form	Quantity (pcs)
SMT12T03AHS	TO220-3L	12T03AH	Tube	50
SMT12T03AHT	TO263-3L	12T03AH	13" Tape&Reel	1,000

Maximum Ratings (@ $T_C = 25^\circ\text{C}$, unless otherwise specified.)

Parameter	Symbol	Value	Unit
Drain - Source Voltage	V_{DS}	120	V
Gate - Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($V_{GS} = 10V$) ⁽¹⁾	I_D	189	A
		134	A
Pulsed Drain Current ⁽²⁾	I_{DM}	757	A
Single Pulse Avalanche Energy ⁽³⁾	E_{AS}	922	mJ
Single Pulse Avalanche Current ($L = 0.1\text{mH}$)	I_{AS}	78	A
Power Dissipation	P_D	263	W
		132	W
Junction & Storage Temperature Range	T_J, T_{STG}	-55 ~ +175	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient ⁽⁴⁾	$R_{\theta JA}$	29	34	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case ⁽⁵⁾	$R_{\theta JC}$	0.44	0.57	$^\circ\text{C/W}$

Electrical Characteristics (@ $T_J = 25^\circ\text{C}$, unless otherwise specified.)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit	
Off Characteristics ⁽⁶⁾							
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	120	-	-	V	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 120V, V _{GS} = 0V	-	-	1.0	μA	
		T _J = 125°C	-	-	100	μA	
Gate-Source Leakage Current	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V	-	-	±100	nA	
On Characteristics ⁽⁶⁾							
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D = 250μA	2.0	3.0	4.0	V	
Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} = 10V, I _D = 20A	TO263-3L	-	3.0	3.6	mΩ
			TO220-3L	-	3.3	3.9	mΩ
Forward Transconductance	g _{fs}	V _{DS} = 5.0V, I _D = 20A	-	57	-	S	
Diodes Forward Voltage	V _{SD}	I _S = 2.0A, V _{GS} = 0V	-	0.7	1.2	V	
Dynamic Characteristics ⁽⁷⁾							
Input Capacitance	C _{iss}	V _{DS} = 60V, V _{GS} = 0V, f = 1MHz	-	4739	-	pF	
Output Capacitance	C _{oss}		-	1765	-	pF	
Reverse Transfer Capacitance	C _{rss}		-	28	-	pF	
Gate Resistance	R _g	V _{GS} = 0V, V _{DS} = 0V, f = 1MHz	-	1.2	-	Ω	
Switching Characteristics ⁽⁷⁾							
Turn-On DelayTime	t _{d(on)}	V _{GS} = 10V, V _{DS} = 60V I _D = 20A, R _{GEN} = 3.0Ω	-	11.6	-	ns	
Rise Time	t _r		-	14.1	-	ns	
Turn-Off DelayTime	t _{d(off)}		-	39	-	ns	
Fall Time	t _f		-	20	-	ns	
Gate Charge Characteristics ⁽⁷⁾							
Total Gate Charge (V _{GS} = 10V)	Q _g	V _{DS} = 60V, I _D = 20A V _{GS} = 10V	-	63	-	nC	
Total Gate Charge (V _{GS} = 7.0V)	Q _g		-	46	-	nC	
Gate-Source Charge	Q _{gs}		-	17.7	-	nC	
Gate-Drain Charge	Q _{gd}		-	12.1	-	nC	
Gate Plateau Voltage	V _{plateau}		-	4.2	-	V	
Drain-Source Diode Characteristics ⁽⁷⁾							
Body Diode Reverse Recovery Time	t _{rr}	I _F = 20A, dI/dt = 100A/μs,	-	83	-	ns	
Body Diode Reverse Recovery Charge	Q _{rr}	T _J = 25°C	-	172	-	nC	
Diode Forward Current	I _S	T _C = 25°C	-	-	125	A	

Notes:

1. This current is chip limited, which is calculated based on R_{thjc} .
2. This current is calculated on single pulse with 10us Single Pulse.
3. Defined by design, not subject to production test, E_{AS} condition: $T_J=25^\circ\text{C}$, $V_{DS}=60V$, $V_{GS}=10V$, $L=1.0mH$.
4. Device mounted on FR-4 substrate PC board with 2oz copper in 1inch square cooling area.
5. Thermal resistance from junction to the exposed pad.
6. Short duration pulse test used to minimize self-heating effect.
7. Defined by design, not subject to production.

Typical Electrical and Thermal Characteristics

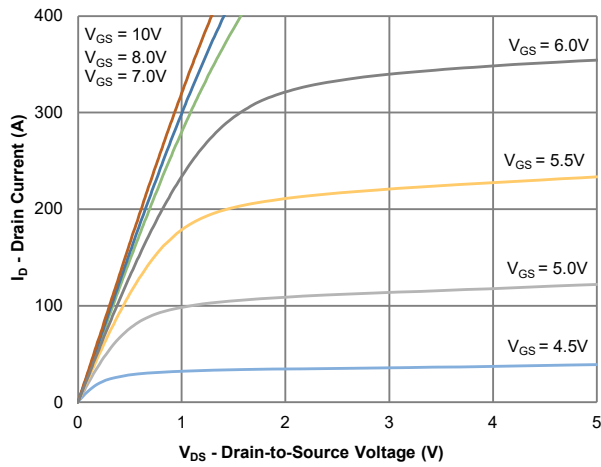


Figure 1: Output Characteristics

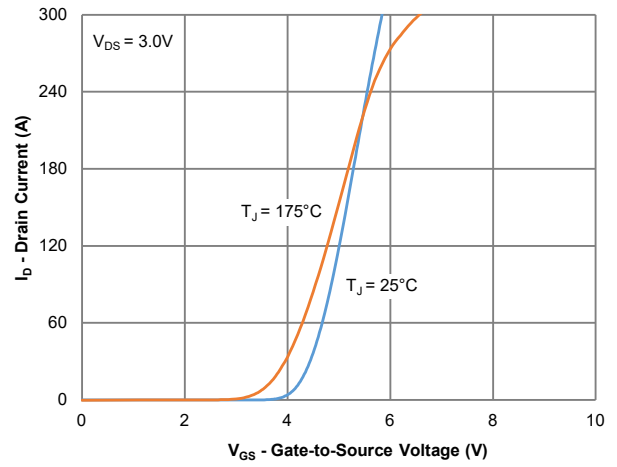


Figure 2: Transfer Characteristics

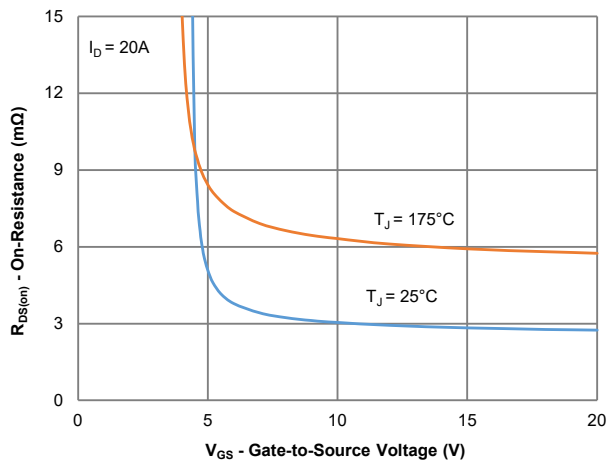


Figure 3: On-Resistance vs. Gate-Source Voltage

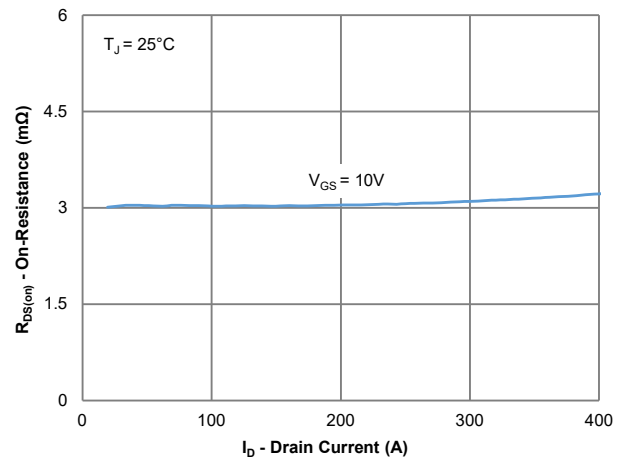


Figure 4: On-Resistance vs. Drain Current and Gate Voltage

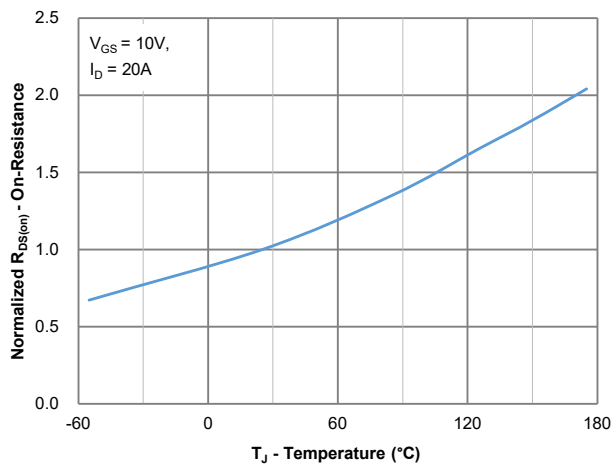


Figure 5: On-Resistance vs. Junction Temperature

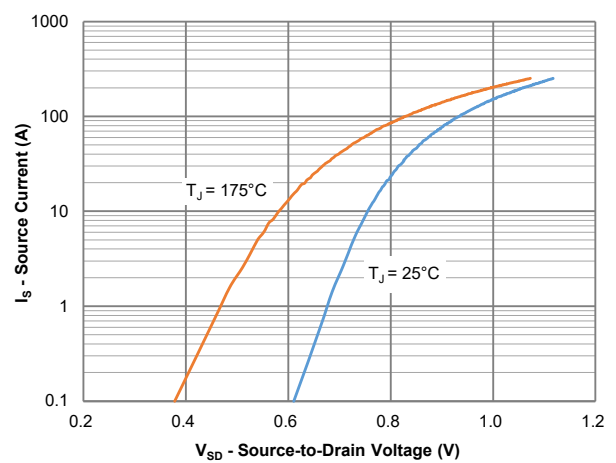


Figure 6: Source-Drain Diode Forward Voltage

Typical Electrical and Thermal Characteristics

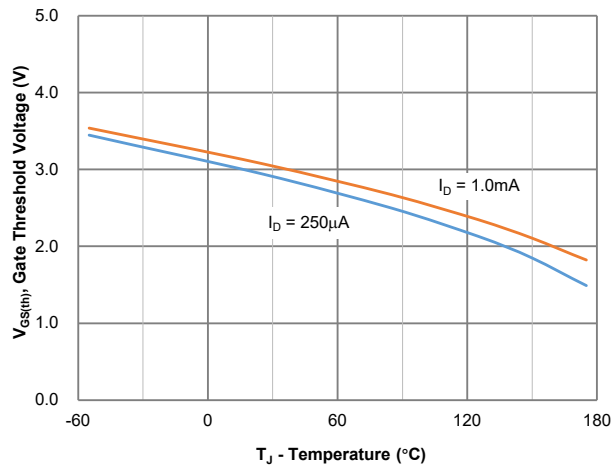


Figure 7: Gate Threshold Variation vs. Junction Temperature

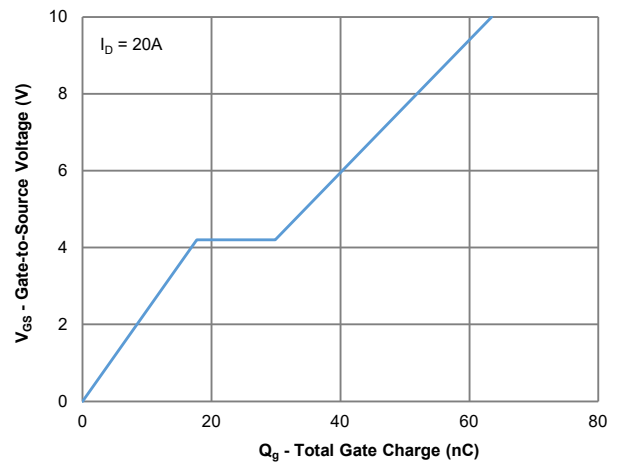


Figure 8: Gate Charge Characteristics

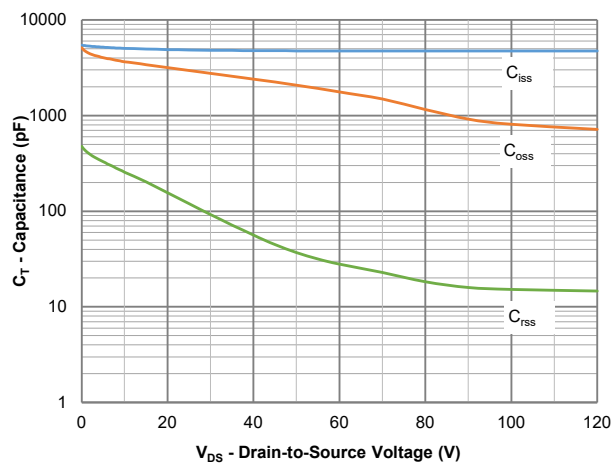


Figure 9: Capacitance Characteristics

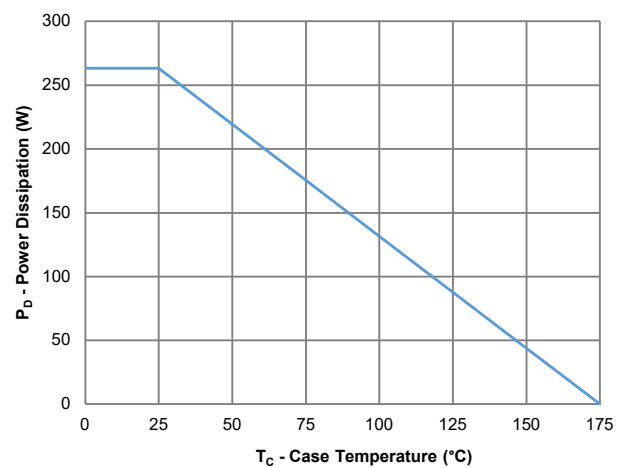


Figure 10: Power Derating

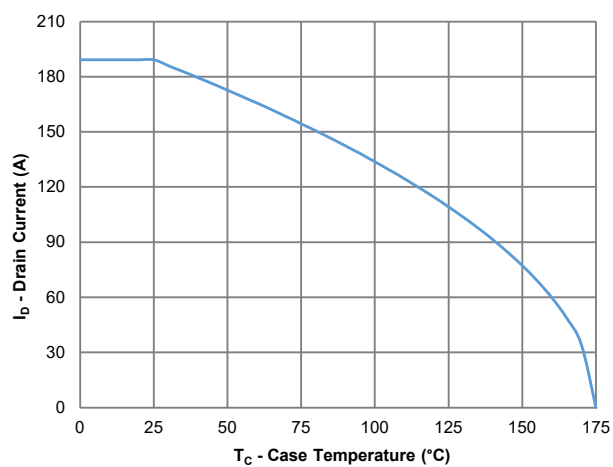


Figure 11: Current Derating

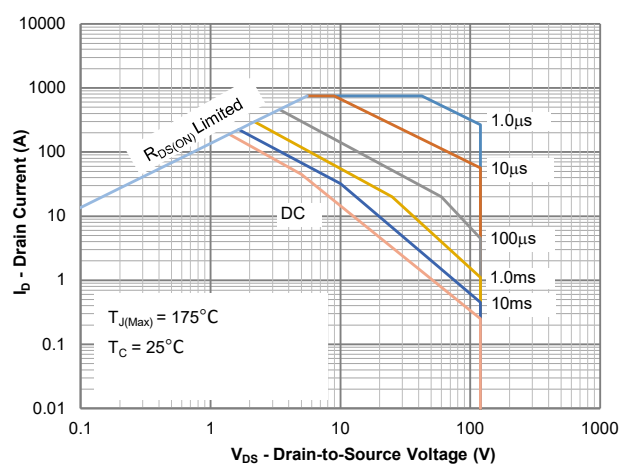


Figure 12: Safe Operating Area

Typical Electrical and Thermal Characteristics

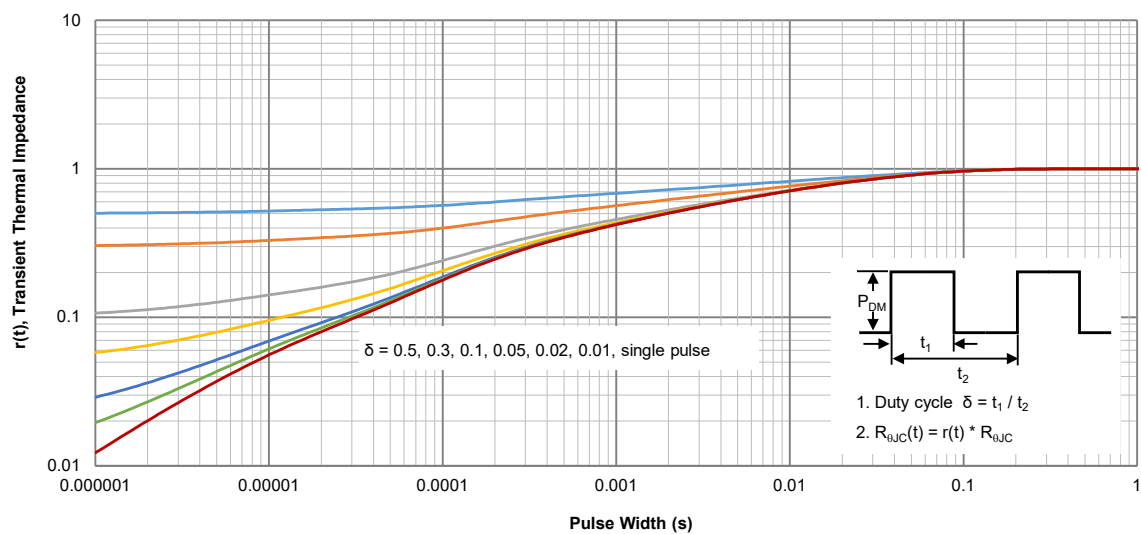
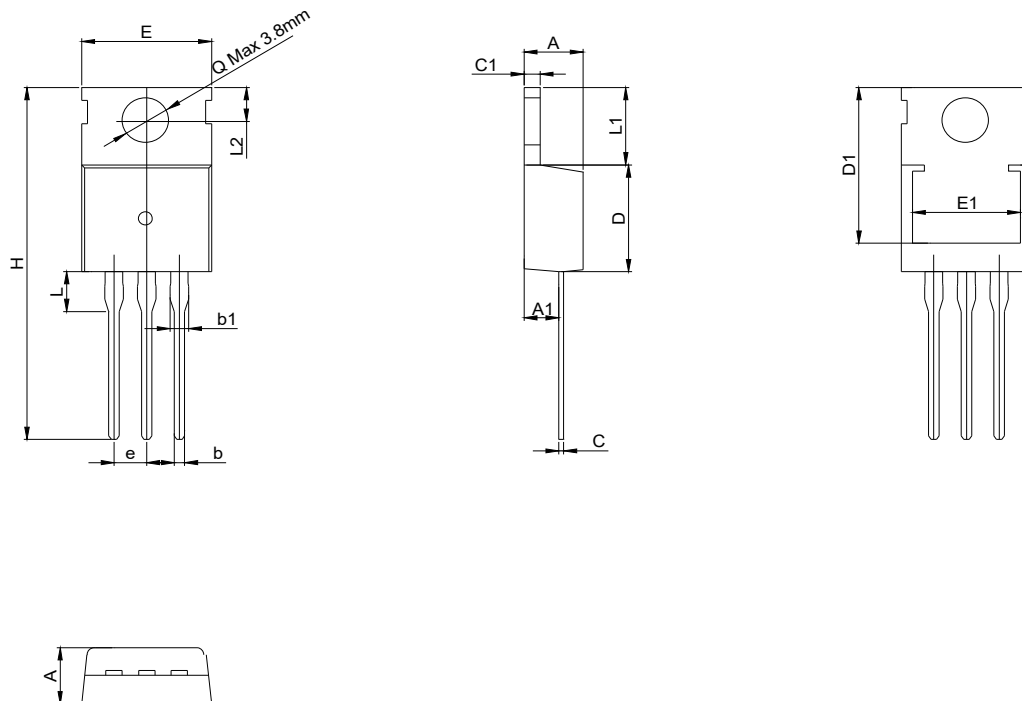
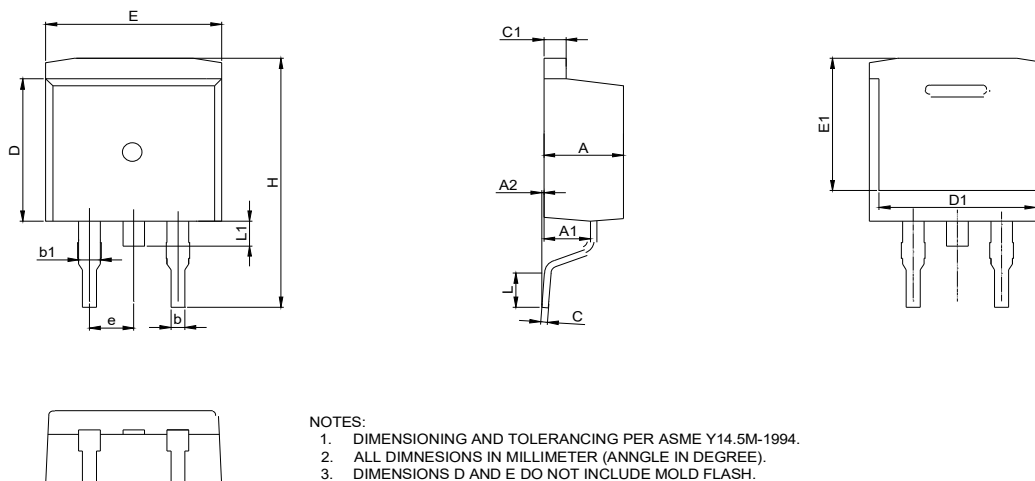


Figure 13: Normalized Maximum Transient Thermal Impedance

TO220-3L Package Outline
Package Outline

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
2. ALL DIMENSIONS IN MILLIMETER (ANGLE IN DEGREE).
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH.

DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	4.35	4.50	4.70
A1	2.20	2.30	3.00
b	0.70	0.80	0.95
b1	1.10	1.30	1.50
C	0.45	0.50	0.60
C1	1.23	1.30	1.40
H	28.00	28.80	29.80
D	8.80	9.21	9.90
D1	12.80	13.20	13.60
E	9.70	10.00	10.50
E1	7.40	8.00	8.60
L	--	--	3.80
L1	6.25	6.50	6.90
L2	2.40	2.90	3.05
e	2.54 BSC		

TO263-3L Package Outline
Package Outline


DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	4.20	4.50	4.70
A1	2.30	--	2.85
A2	0.00	0.10	0.25
b	0.70	0.80	0.95
b1	1.15	1.30	1.70
C	0.30	0.50	0.60
C1	1.15	1.30	1.42
H	14.00	15.20	15.88
D	8.50	9.20	9.60
D1	7.50	7.75	8.00
E	9.78	10.00	10.36
E1	7.60	7.95	8.10
L	1.50	--	2.50
L1	--	--	1.75
e	--	2.54	--

Recommended Footprint (Dimensions are in mm)

Recommended Soldering Footprint :
