

650V SuperJunction Power MOSFET

Features

- Extremely Low Gate Charge
- Excellent Output Capacitance (C_{oss}) Profile
- Fast Switching Capability
- 100% UIS Tested, 100% Rg Tested
- Pb-free Lead Plating
- Halogen-free and RoHS-compliant

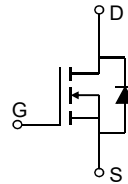
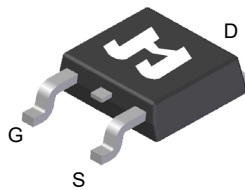
Product Summary

Parameter	Value	Unit
V_{DS}	650	V
$V_{GS(th_Typ)}$	3.5	V
I_D (@ $V_{GS} = 10V$) ⁽¹⁾	11.2	A
$R_{DS(ON_Typ)}$ (@ $V_{GS} = 10V$)	370	m Ω
$E_{oss@400V}$	2.2	μJ

Applications

- Telecom / Server Power Supplies
- Industrial Power Supplies
- UPS / Solar
- Lighting / Charger / Adapter

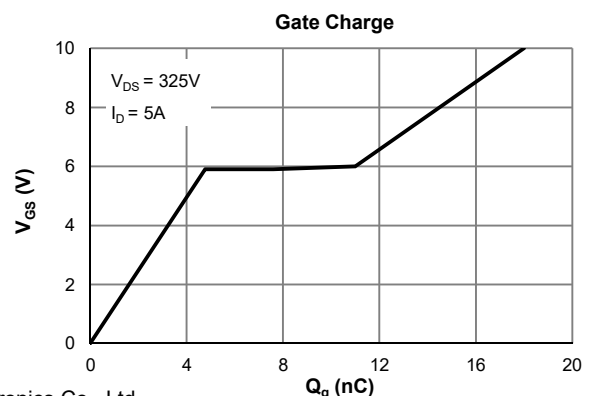
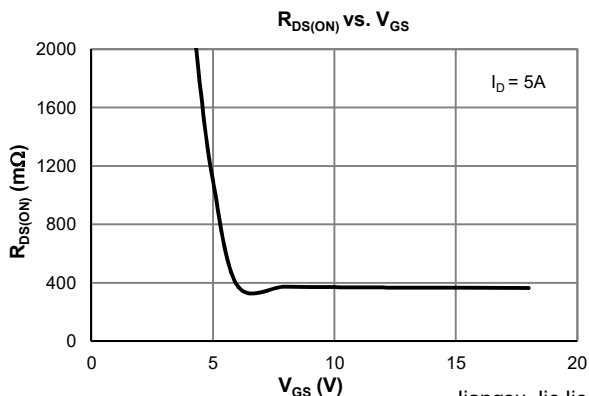
TO-252-3L Top View


Ordering Information

Device	Package	# of Pins	Marking	MSL	T_J (°C)	Media	Quantity (pcs)
JMH65R430AK-13	TO-252-3L	3	H65R430A	1	-55 to 150	13-inch Reel	2500

Absolute Maximum Ratings (@ $T_A = 25^\circ C$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DS}	650	V
Gate-to-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current ⁽¹⁾	I_D	$T_C = 25^\circ C$	11.2
		$T_C = 100^\circ C$	7.1
Pulsed Drain Current ⁽²⁾	I_{DM}	29	A
Avalanche Current ⁽³⁾	I_{AS}	6.0	A
Avalanche Energy ⁽³⁾	E_{AS}	180	mJ
Power Dissipation ⁽⁴⁾	P_D	$T_C = 25^\circ C$	145
		$T_C = 100^\circ C$	58
Junction & Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C





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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	650			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 650\text{V}, V_{GS} = 0\text{V}$			1.0	μA
Gate-Body Leakage Current	I_{GSS}	$V_{DS} = 0\text{V}, V_{GS} = \pm 30\text{V}$			± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	2.5	3.5	4.5	V
Static Drain-Source ON-Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{V}, I_D = 10\text{A}$		370	430	$\text{m}\Omega$
Diode Forward Voltage	V_{SD}	$I_S = 1\text{A}, V_{GS} = 0\text{V}$		0.75	1.0	V
Diode Continuous Current	I_S	$T_C = 25^\circ\text{C}$			145	A

DYNAMIC PARAMETERS ⁽⁵⁾

Input Capacitance	C_{iss}	$V_{GS} = 0\text{V}, V_{DS} = 100\text{V}, f = 1\text{MHz}$		703		pF
Output Capacitance	C_{oss}			25		pF
Reverse Transfer Capacitance	C_{rss}			2.1		pF
Effective output capacitance, energy related	$C_{o(er)}$	$V_{GS} = 0\text{V}, V_{DS} = 0 \text{ to } 400\text{V}$		28		pF
Effective output capacitance, time related	$C_{o(tr)}$			119		pF
Gate Resistance	R_g	$V_{GS} = 0\text{V}, V_{DS} = 0\text{V}, f = 1\text{MHz}$		8.5		Ω

SWITCHING PARAMETERS ⁽⁵⁾

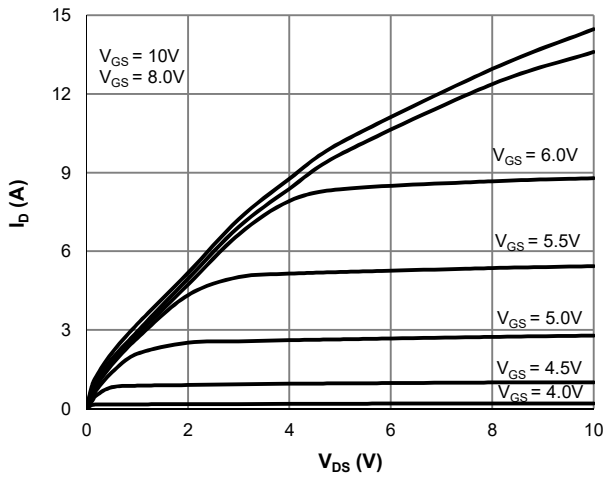
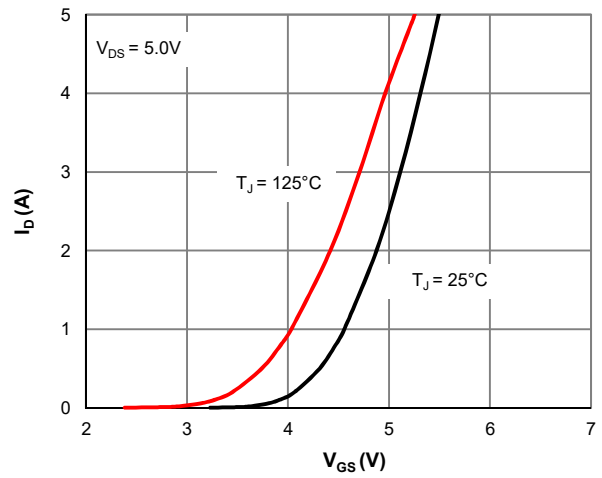
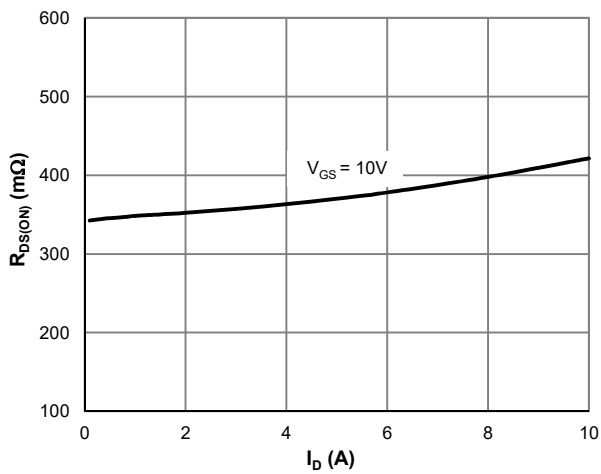
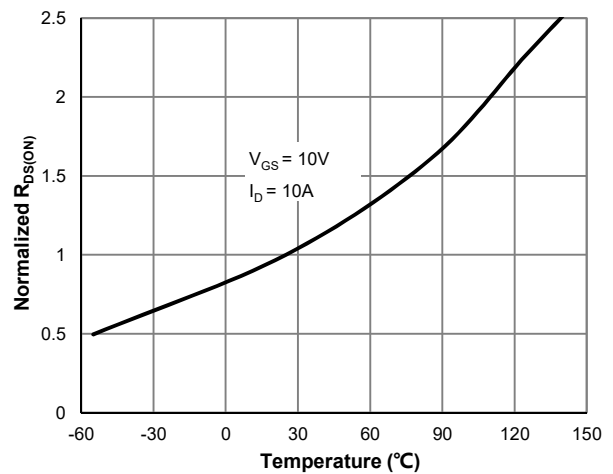
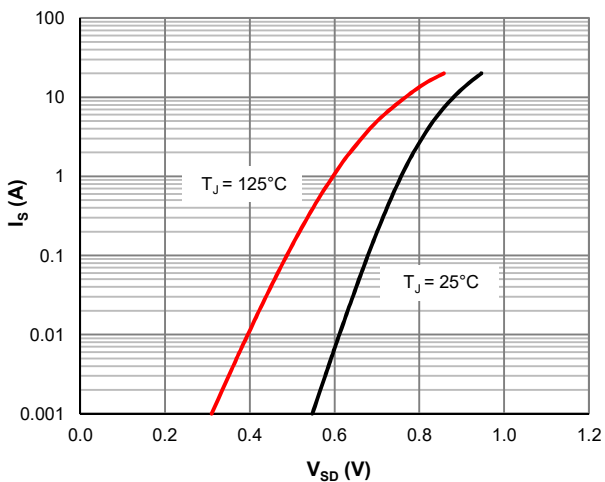
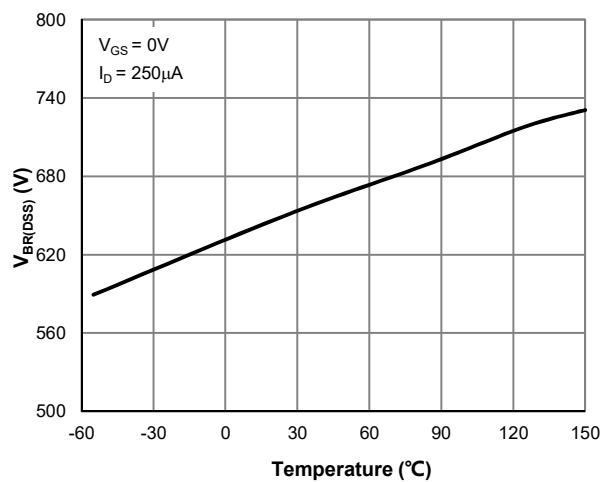
Total Gate Charge (@ $V_{GS} = 10\text{V}$)	Q_g	$V_{GS} = 0 \text{ to } 10\text{V}$ $V_{DS} = 325\text{V}, I_D = 5\text{A}$		18.4		nC
Total Gate Charge (@ $V_{GS} = 6.0\text{V}$)	Q_g			11.0		nC
Gate Source Charge	Q_{gs}			4.8		nC
Gate Drain Charge	Q_{gd}			7.6		nC
Turn-On DelayTime	$t_{D(on)}$	$V_{GS} = 10\text{V}, V_{DS} = 325\text{V}$ $R_L = 65\Omega, R_{GEN} = 6\Omega$		27		ns
Turn-On Rise Time	t_r			16.8		ns
Turn-Off DelayTime	$t_{D(off)}$			104		ns
Turn-Off Fall Time	t_f			31		ns
Body Diode Reverse Recovery Time	t_{rr}		$I_F = 5\text{A}, di/dt = 100\text{A}/\mu\text{s}$		239	
Body Diode Reverse Recovery Charge	Q_{rr}	$I_F = 5\text{A}, di/dt = 100\text{A}/\mu\text{s}$		2513		nC
Peak Diode Recovery Voltage Slope	dv/dt	$I_F \leq 10\text{A}, di/dt = 200\text{A}/\mu\text{s}, V_{DS} = 400\text{V}$		15		V/ns
MOSFET dv/dt Ruggedness	dv/dt	$V_{DS} = 0 \dots 400\text{V}$		50		V/ns

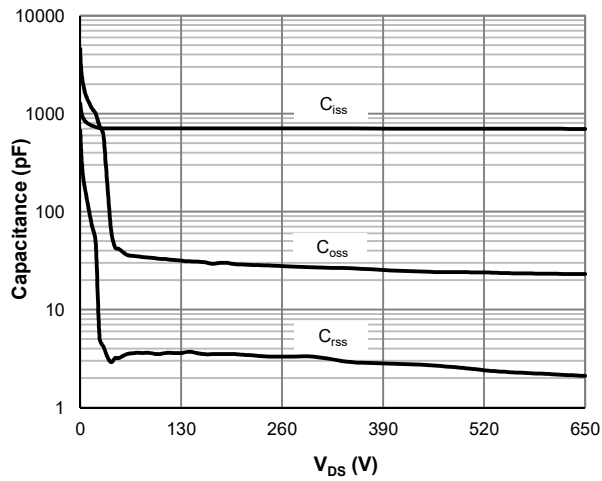
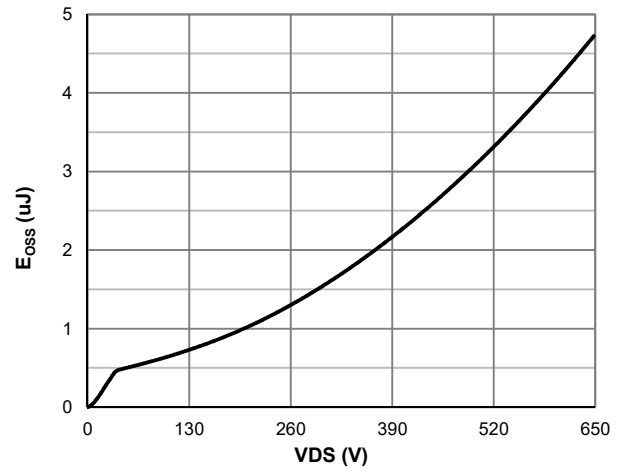
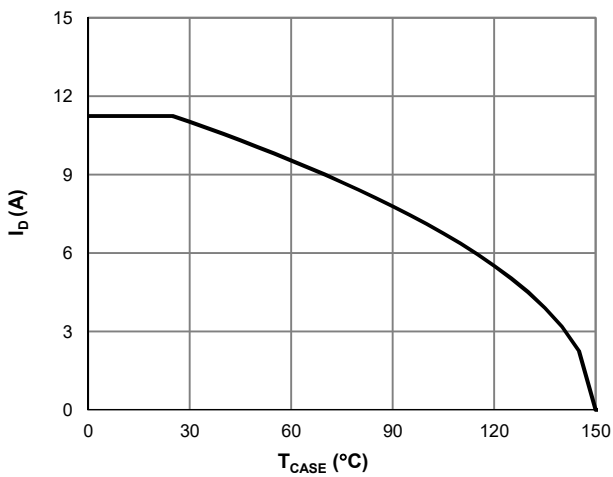
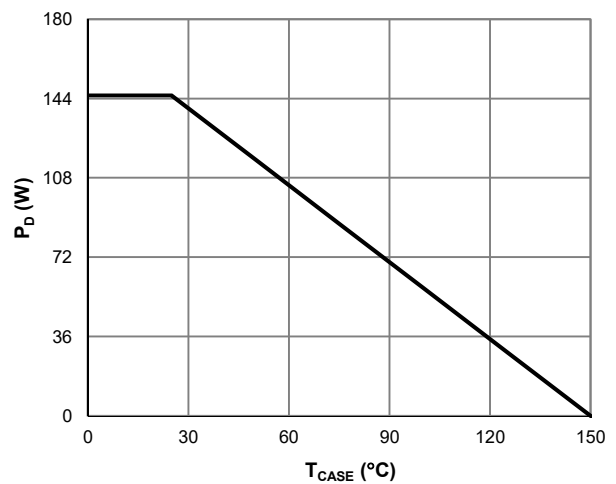
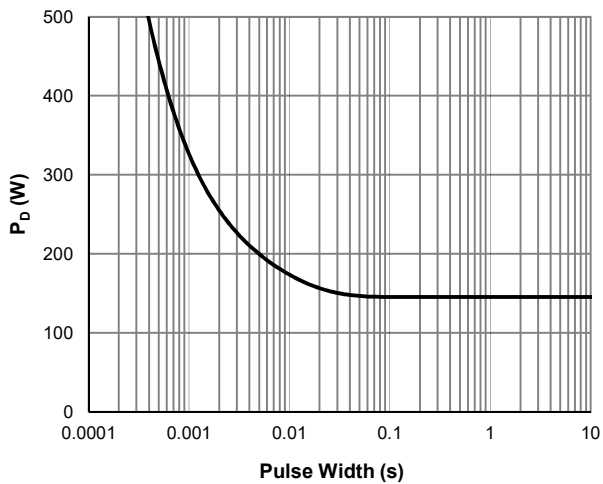
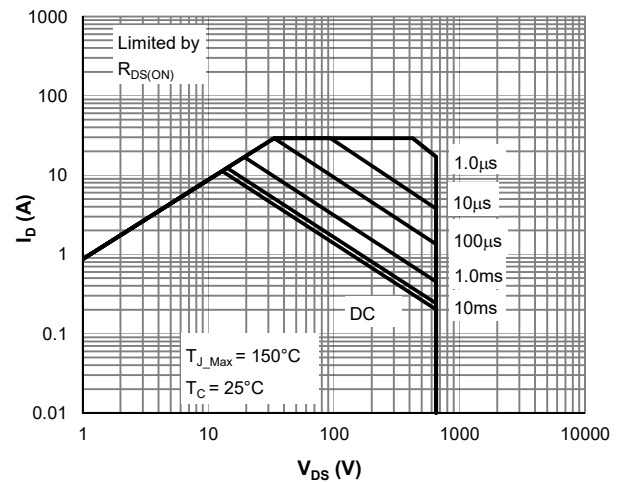
Thermal Performance

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	48	58	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.86	1.1	$^\circ\text{C}/\text{W}$

Notes:

1. Computed continuous current assumes the condition of T_{J_Max} while the actual continuous current depends on the thermal & electro-mechanical application board design.
2. This single-pulse measurement was taken under $T_{J_Max} = 150^\circ\text{C}$.
3. This single-pulse measurement was taken under the following condition [$L = 10\text{mH}, V_{GS} = 10\text{V}, V_{DS} = 50\text{V}$] while its value is limited by $T_{J_Max} = 150^\circ\text{C}$.
4. The power dissipation P_D is based on $T_{J_Max} = 150^\circ\text{C}$.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Electrical & Thermal 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 7: Body-Diode Characteristics

Figure 6: $V_{BR(DSS)}$ vs. Junction Temperature

Typical Electrical & Thermal Characteristics

Figure 8: Capacitance Characteristics

Figure 8: Coss Stoted Energy

Figure 9: Current De-rating

Figure 10: Power De-rating

Figure 11: Single Pulse Power Rating, Junction-to-Case

Figure 12: Maximum Safe Operating Area



Typical Electrical & Thermal Characteristics

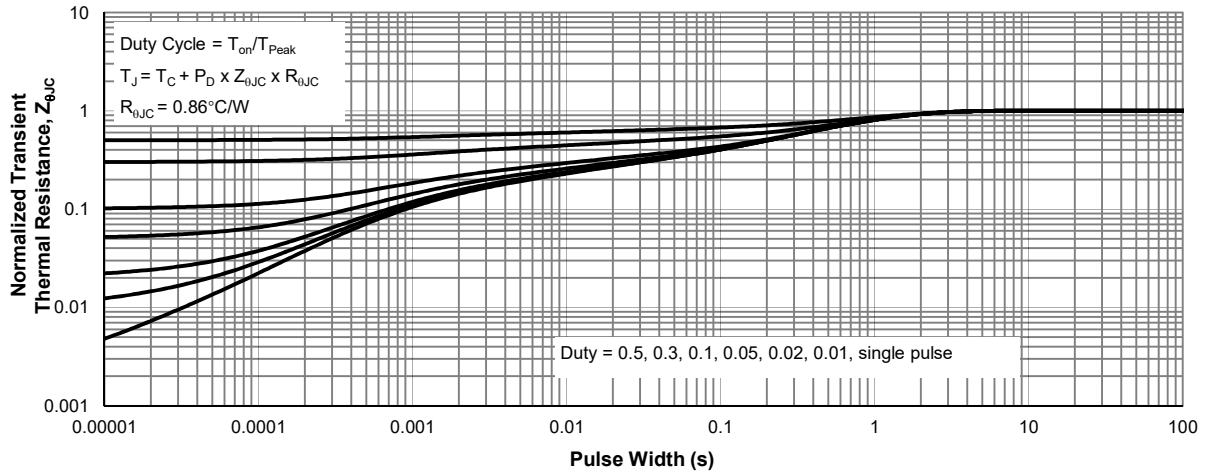
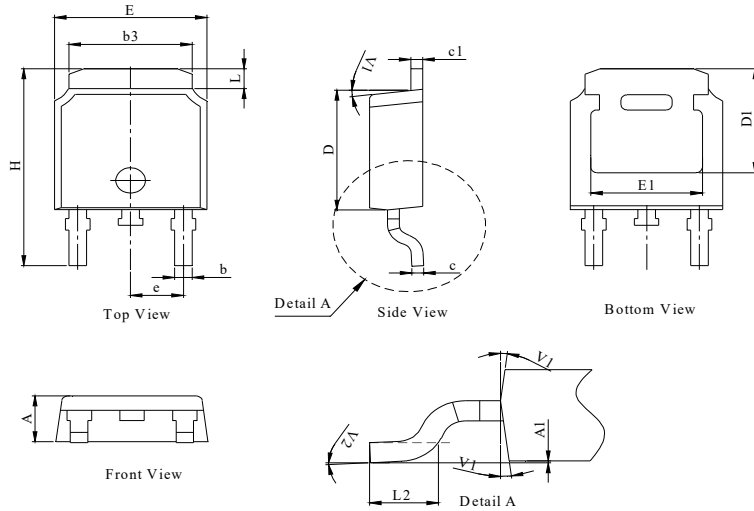
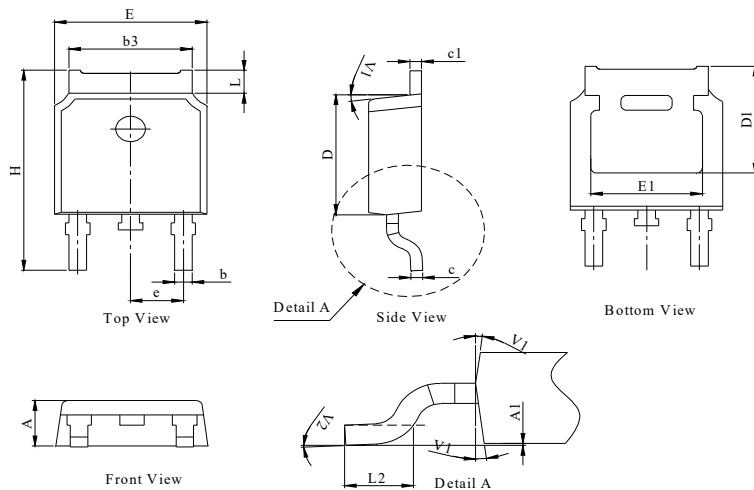


Figure 13: Normalized Maximum Transient Thermal Impedance

TO-252-3L Package Information
Package Outline Type-A


DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	2.18	2.30	2.39
A1	0	--	0.13
b	0.64	0.76	0.89
c	0.40	0.50	0.61
c1	0.46	0.50	0.58
D	5.97	6.10	6.23
D1	5.05	--	--
E	6.35	6.60	6.73
E1	4.32	--	--
b3	5.21	5.38	5.55
e	2.29 BSC		
H	9.40	10.00	10.40
L	0.89	--	1.27
L2	1.40	--	1.78
V1	7° REF		
V2	0°	--	6°

Package Outline Type-B


DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	2.10	2.30	2.40
A1	0	--	0.13
b	0.66	0.76	0.86
b3	5.21	5.38	5.55
c	0.40	0.50	0.60
c1	0.44	0.50	0.58
D	5.90	6.10	6.30
D1	5.30REF		
E	6.40	6.60	6.80
E1	4.63	-	-
e	2.29 BSC		
H	9.50	10.00	10.70
L	1.09	--	1.21
L2	1.35	--	1.65
V1	7° REF		
V2	0°	--	6°

Recommended Soldering Footprint
