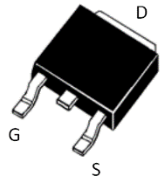
60V N-Channel Power MOSFET

DESCRIPTION：

- ·Low $R_{DS(ON)}$
- ·Low gate charge
- ·100% UIS Tested,
- ·100% Rg Tested
- ·Pb-free Lead Plating
- ·Halogen-free and RoHS-compliant
- ·AEC-Q101 Qualified for Automotive Applications

V_{DS}	60V
I_D @V_{GS}=10V	57A
$R_{DS(ON)}$ @V_{GS}=10V	9.9mΩ



TO-252

MAXIMUM RATINGS (at T_C = 25 °C, unless otherwise specified)

Characteristic	Condition	Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current(1)	Tc=25℃ Tc=100℃	I_D	57 40	A
Pulsed Drain Current (2)		I_{DM}	149	A
Avalanche Energy (3)		E_{AS}	58	mJ
Power dissipation (4)	T_C=25℃ T_C=100℃	P_D	83 41	W
Junction & Storage temperature Range		T_J, T_{STG}	-55~+175	℃

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} = 175°C.

3. EAS of 58 mJ is based on starting T_J = 25°C. L = 3.0mH, I_{AS} = 6.2A, V_{GS} = 10V, V_{DD} = 30V; 100% test at L = 0.1mH, IAS = 20A. T_{J_Max} = 175°C

4. The power dissipation PD is based on T_{J_Max} = 175°C

ELECTRICAL CHARATERISTICS (at T_J = 25 °C, unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage VGS = 0V, ID = 250uA	$V_{(BR)DSS}$	60			V
Zero Gate Voltage Drain Current VDS = 48 V, VGS = 0 V, T_J = 25 °C VDS = 48 V, VGS = 0 V, T_J = 55 °C	I_{DSS}			1.0 5.0	uA
Gate-Source Leakage Current VGS = ±20V, VDS = 0V	I_{GSS}			±100	nA
Gate-Source threshold voltage VDS = VGS, ID = 250uA	$V_{GS(th)}$	1.2	1.7	2.5	V
Drain-Source On-State Resistance VGS = 10V, ID = 20A VGS = 4.5V, ID = 15A	$R_{DS(on)}$		9.9 12.6	12.0 16.0	mΩ
Forward Transfer Conductance VDS=5V,ID=20A	g_{fs}		94		S
Input capacitance f=1MHz, VDS= 30 V, VGS=0 V	C_{iss}		734		pF
Output capacitance f=1MHz, VDS= 30 V, VGS=0 V	C_{oss}		204		pF
Reverse transfer capacitance f=1MHz, VDS= 30 V, VGS=0 V	C_{rss}		26		pF
Gate Resistance f=1MHz, VDS= 0 V, VGS=0 V	Rg		1.4		Ω
Total Gate Charge VDS= 30V, ID= 20A, VGS= 10V VDS= 30V, ID= 20A, VGS= 4.5V	Q_G		13.1 6.4		nC
Gate to Source Charge VDS= 30V, ID= 20A, VGS= 0 to 10V	Q_{GS}		2.9		nC
Gate to Drain Charge VDS= 30V, ID= 20A, VGS= 0 to 10V	Q_{GD}		2.5		nC
Turn-on delay time VDS= 30 V, VGS= 10V, R_L = 1.5Ω, R_{GEN} = 3Ω	$t_{d\ (ON)}$		5.9		ns
Rise time VDS= 30 V, VGS= 10V, R_L = 1.5Ω, R_{GEN} = 3Ω	tr		6.6		ns
Turn-off delay time VDS= 30 V, VGS= 10V, R_L = 1.5Ω, R_{GEN} = 3Ω	$t_{d\ (OFF)}$		15.3		ns
Fall time VDS= 30 V, VGS= 10V, R_L = 1.5Ω, R_{GEN} = 3Ω	tf		2.3		ns

Body Diode

ELECTRICAL CHARATERISTICS (at T_J = 25 °C, unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Diode Forward Voltage VGS = 0V, I_S = 1A	V_{SD}		0.70	1.0	V
Diode Continuous Current	I_S			57	A
Revers Recovery Time IF= 20A, di/dt = 100A/us	Trr		20.2		ns
Revers Recovery Charge IF= 20A, di/dt = 100A/us	Qrr		8.7		nC

THERMAL CHARACTERISTICS

Characteristic	Condition	Symbol	Value	Unit
Thermal resistance,	Junction to Ambient Junction to Case	$R_{\theta JA}$ $R_{\theta JC}$	40 1.8	℃/W

Typical Performance Characteristics

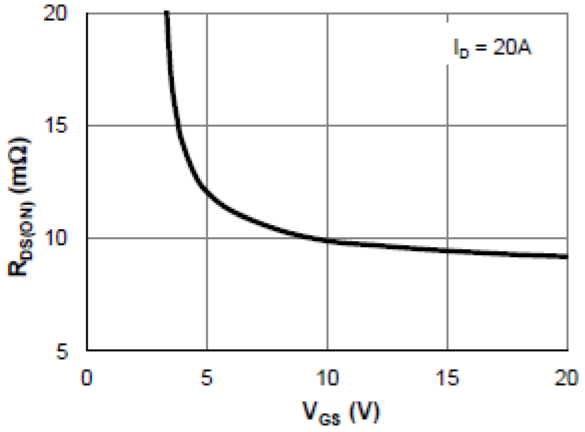


Figure 1 $R_{DS(on)}$ vs. V_{GS}

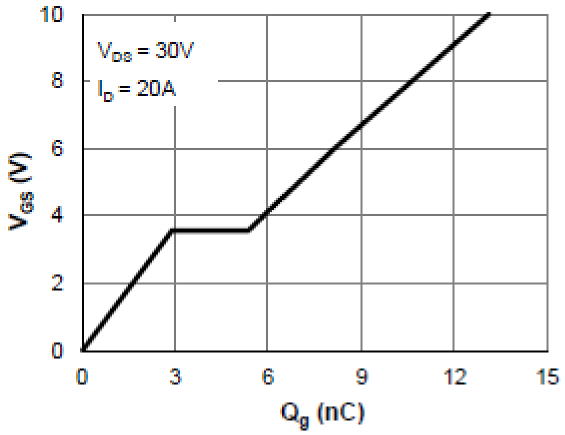


Figure 2. Gate Charge

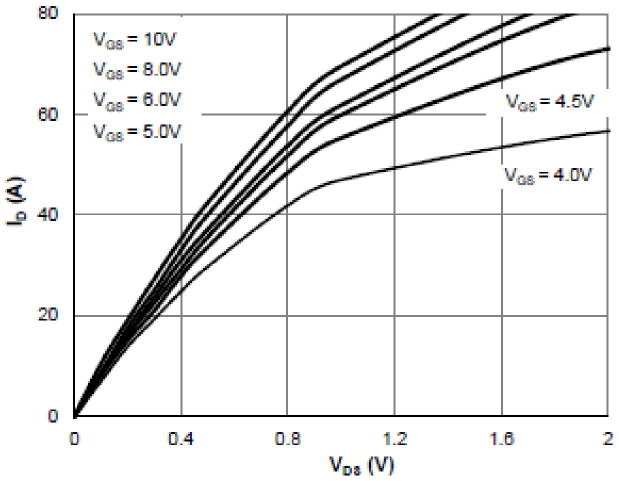


Figure 3. Saturation Characteristics

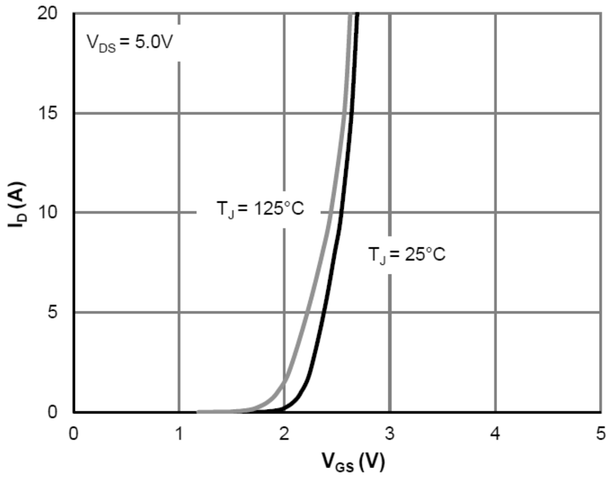


Figure 4. Transfer Characteristics

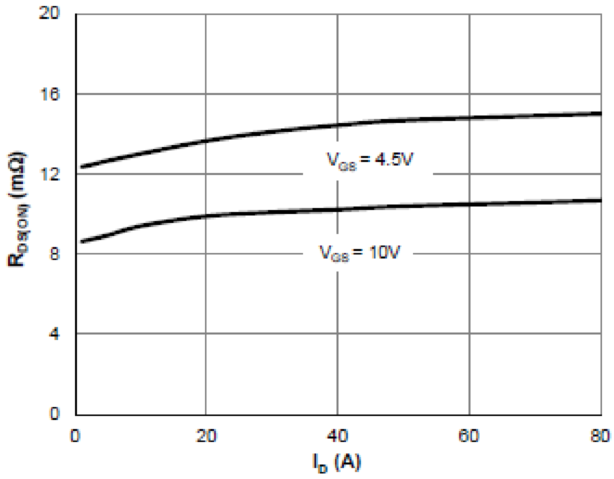


Figure 5. $R_{DS(ON)}$ vs. Drain Current

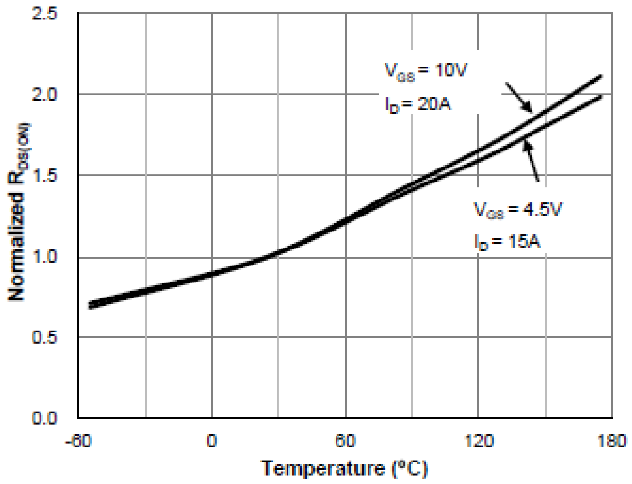


Figure 6. $R_{DS(on)}$ vs. Transfer Characteristics

Typical Performance Characteristics

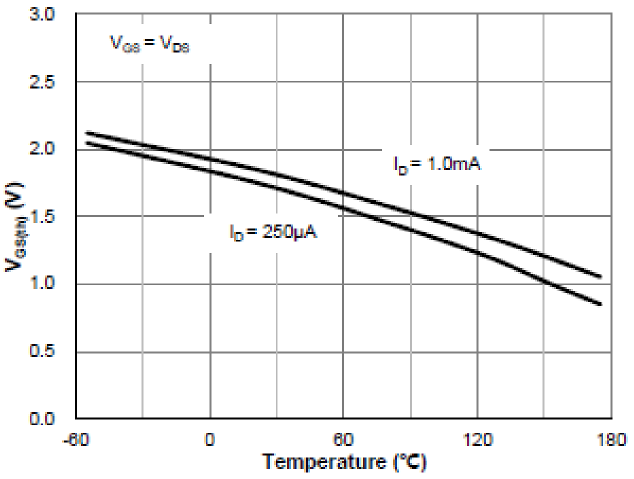


Figure 7. $V_{GS(th)}$ vs. Junction Temperature

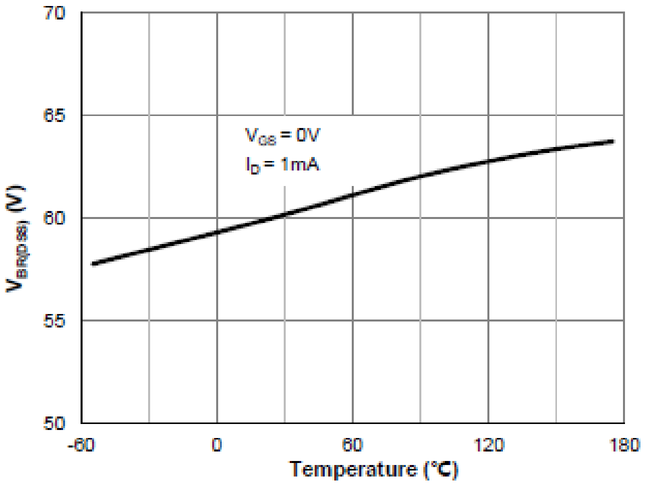


Figure 8. $V_{BR(DSS)}$ vs. Junction Temperature

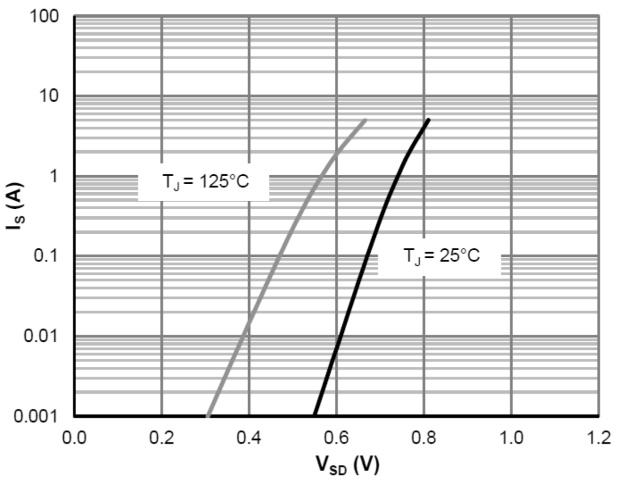


Figure 9. Body-Diode Characteristics

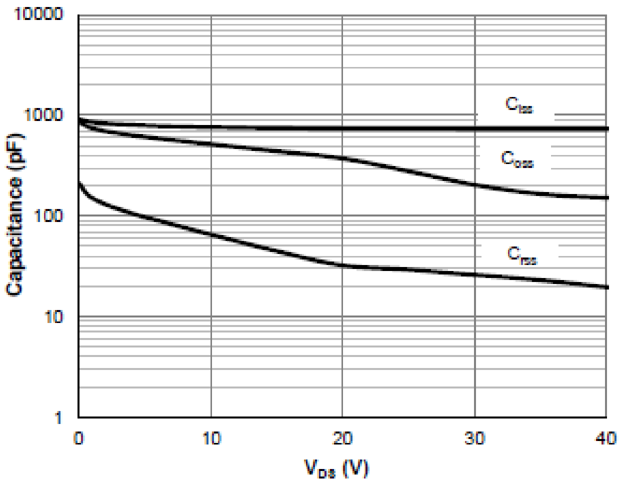


Figure 10. Capacitance Characteristics

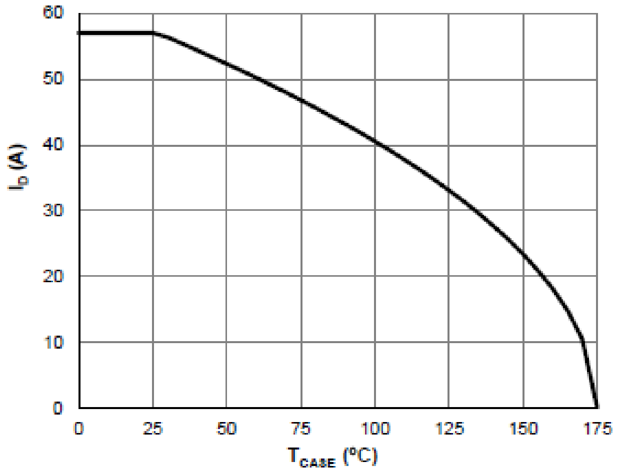


Figure 11. Current De-rating

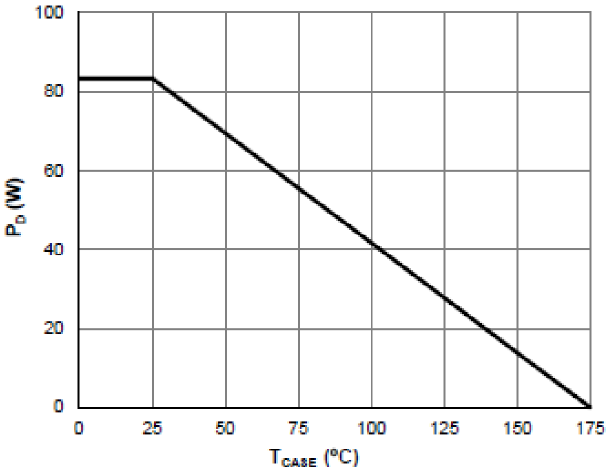
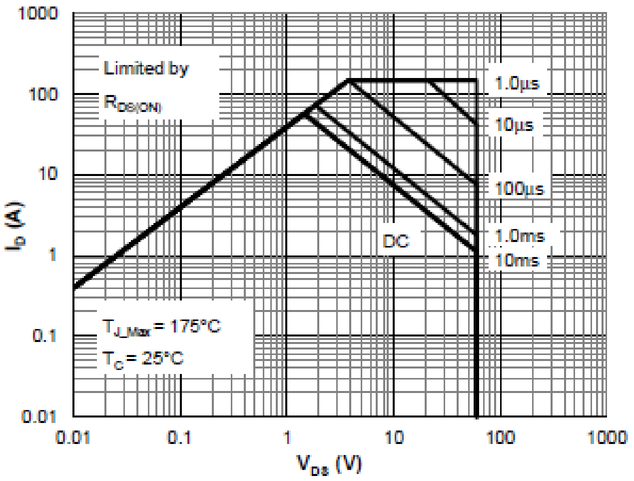


Figure 12. Power De-rating

Typical Performance Characteristics



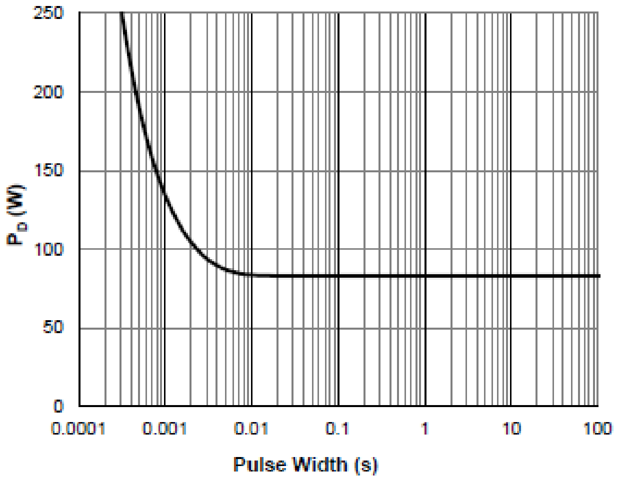


Figure 13. Maximum Safe Operating Area

Figure 14. Single Pulse Power Rating, Junction-to-Case

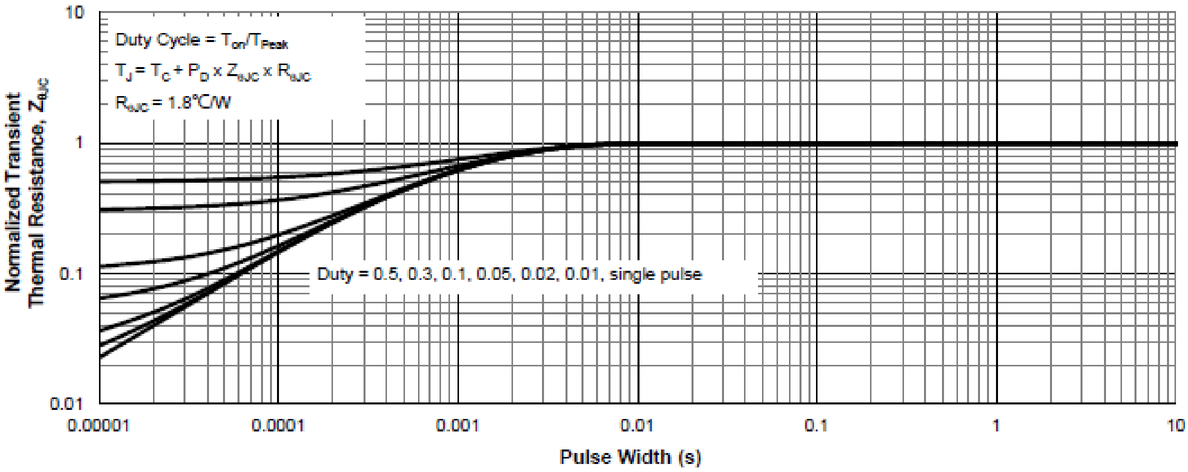
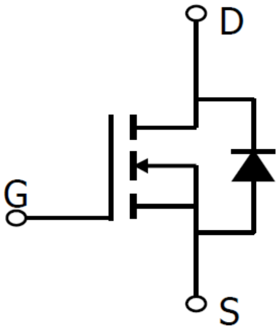


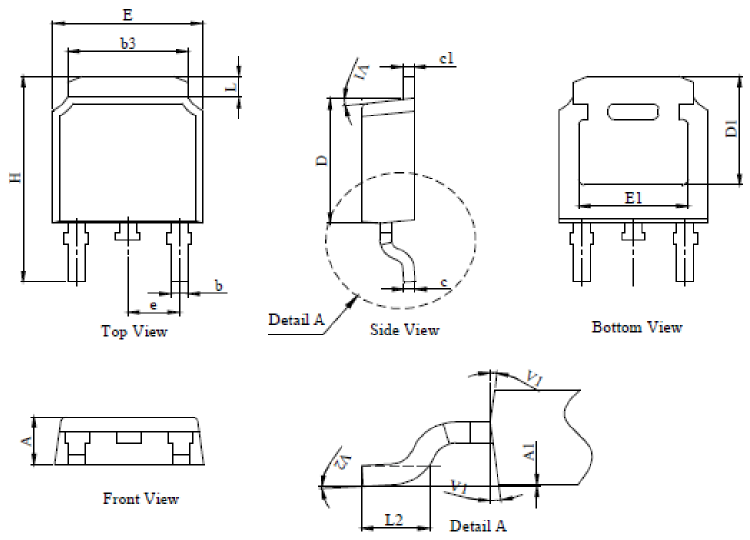
Figure 15. Normalized Maximum Transient Thermal Impedance

·Circuit diagram



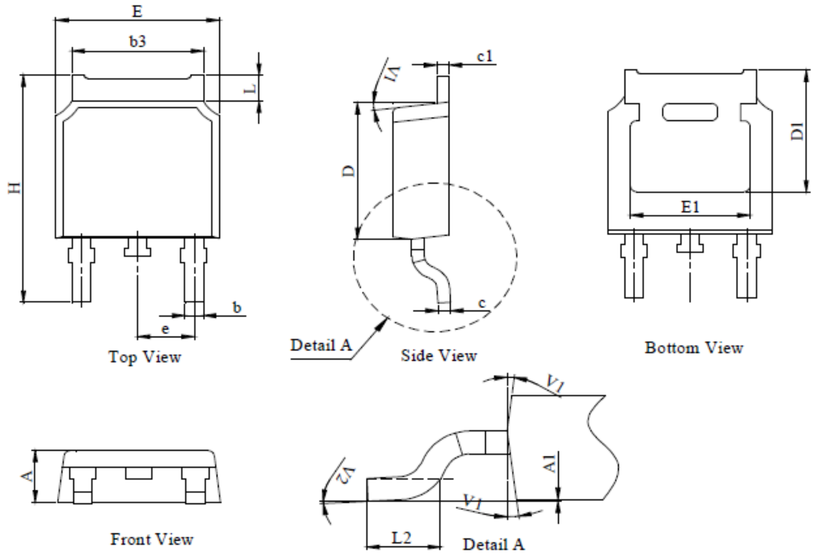
·Package outlines : Dimensions in (mm)

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°

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