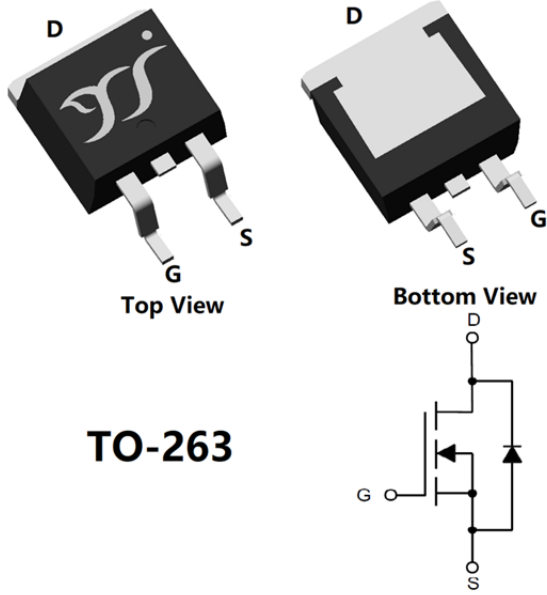


## N-Channel Enhancement Mode Field Effect Transistor



**TO-263**

### Product Summary

- $V_{DS}$  150V
- $I_D$  60A
- $R_{DS(ON)}$  (at  $V_{GS}=10V$ ) < 18mohm
- 100% EAS Tested
- 100%  $\nabla V_{DS}$  Tested

### General Description

- Excellent package for heat dissipation
- High density cell design for low  $R_{DS(ON)}$
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free
- Part no. with suffix "Q" means AEC-Q101 qualified

### Applications

- Power switching application
- Uninterruptible power supply
- DC-DC convertor
- 12V Automotive systems

### ■ Absolute Maximum Ratings ( $T_A=25^\circ C$ unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-source Voltage		$V_{DS}$	150	V
Gate-source Voltage		$V_{GS}$	$\pm 20$	V
Drain Current	$T_A=25^\circ C$	$I_D$	7	A
	$T_A=100^\circ C$		5	
	$T_C=25^\circ C$		60	
	$T_C=100^\circ C$		42	
Pulsed Drain Current <sup>A</sup>		$I_{DM}$	180	A
Avalanche energy <sup>B</sup>		EAS	200	mJ
Total Power Dissipation <sup>C</sup>	$T_A=25^\circ C$	$P_D$	3.5	W
	$T_A=100^\circ C$		1.7	
	$T_C=25^\circ C$		156	
	$T_C=100^\circ C$		78	
Junction and Storage Temperature Range		$T_J, T_{STG}$	-55~+175	$^\circ C$

### ■ Thermal resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient <sup>D</sup>	Steady-State	$R_{\theta JA}$	35	42	$^\circ C/W$
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	0.8	0.96	

### ■ Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJB60G15HQ	F2	YJB60G15H	800	/	8000	13" reel



# YJB60G15HQ

## ■ Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Static Parameter</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	150			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =150V, V <sub>GS</sub> =0V			1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V			±100	nA
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2	3	4	V
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A		13.5	18	mΩ
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =20A, V <sub>GS</sub> =0V		0.85	1.3	V
Gate resistance	R <sub>G</sub>	f=1MHz		0.8		Ω
<b>Dynamic Parameters</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz	-	2600	-	pF
Output Capacitance	C <sub>oss</sub>		-	1150	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	120	-	
<b>Switching Parameters</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =75V, I <sub>D</sub> =20A	-	40	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	10	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	11	-	
Reverse Recovery Charge	Q <sub>rr</sub>	I <sub>F</sub> =20A, di/dt=100A/us	-	210	-	nC
Reverse Recovery Time	t <sub>rr</sub>		-	92	-	ns
Turn-on Delay Time	t <sub>D(on)</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =75V, I <sub>D</sub> =20A R <sub>GEN</sub> =4.5Ω	-	15	-	ns
Turn-on Rise Time	t <sub>r</sub>		-	14	-	
Turn-off Delay Time	t <sub>D(off)</sub>		-	29	-	
Turn-off fall Time	t <sub>f</sub>		-	13	-	

A. Repetitive rating; pulse width limited by max. junction temperature.

B. T<sub>J</sub>=25°C, V<sub>DD</sub>=55V, V<sub>G</sub>=10V, R<sub>G</sub>=25Ω, L=1mH, I<sub>AS</sub>=20A.

C. P<sub>d</sub> is based on max. junction temperature, using junction-case thermal resistance.

D. The value of R<sub>θJA</sub> is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The maximum allowed junction temperature of 175°C. The value in any given application depends on the user's specific board design.



# YJB60G15HQ

## Typical Electrical and Thermal Characteristics Diagrams

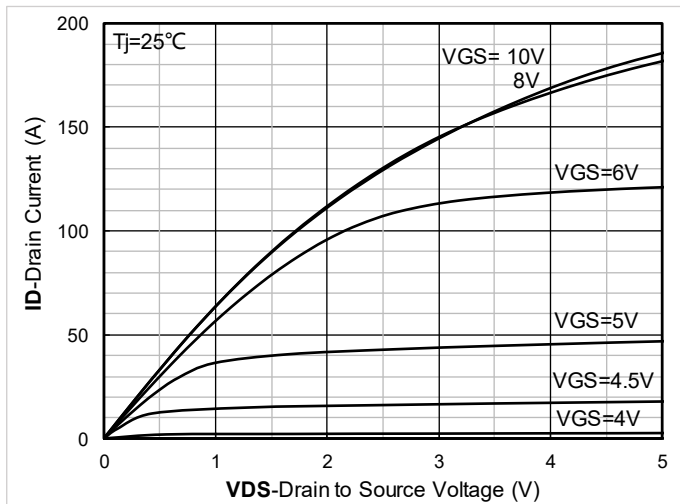


Figure1. Output Characteristics

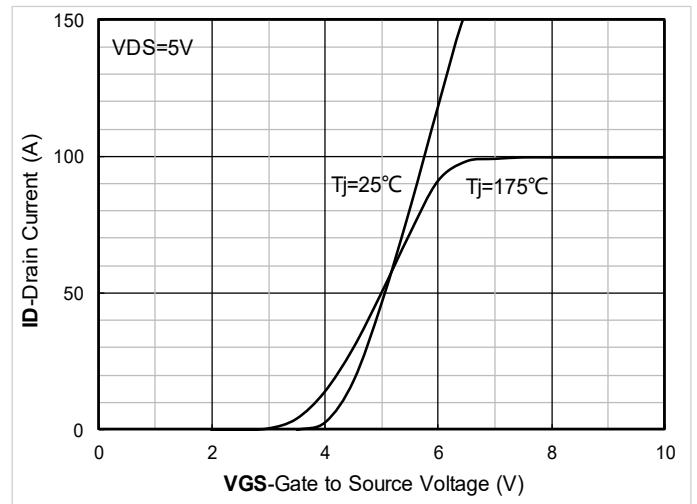


Figure2. Transfer Characteristics

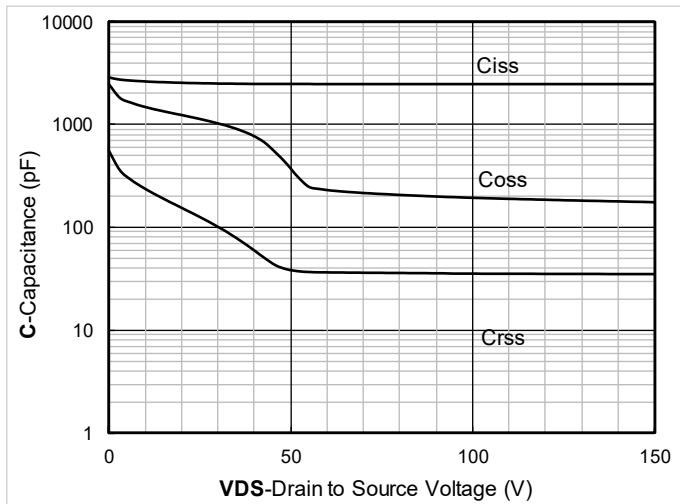


Figure3. Capacitance Characteristics

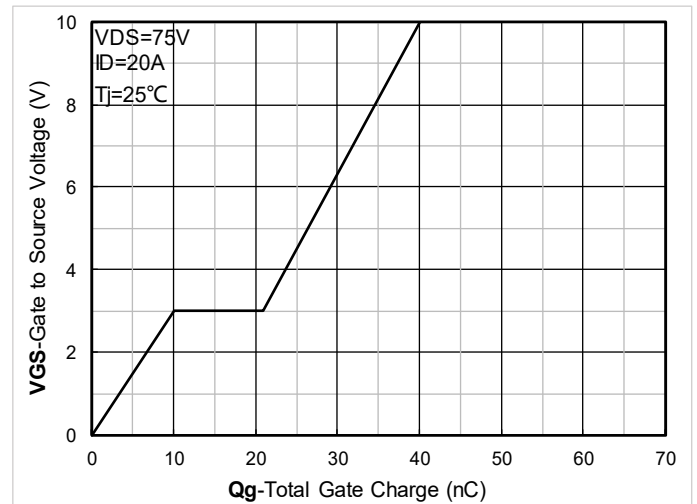


Figure4. Gate Charge

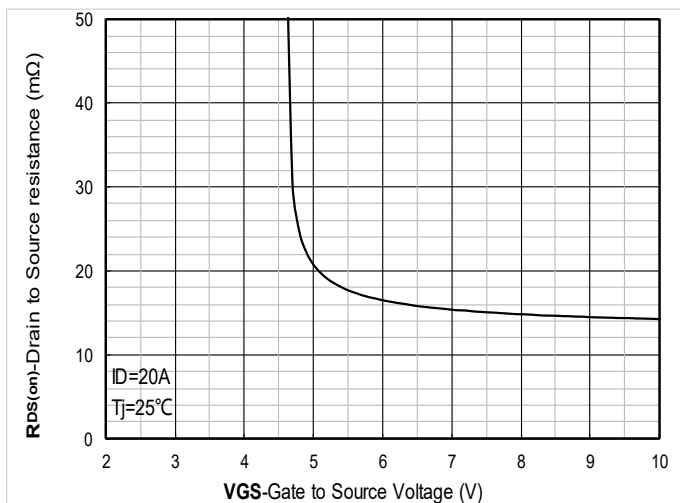


Figure5. On-Resistance vs Gate to Source Voltage

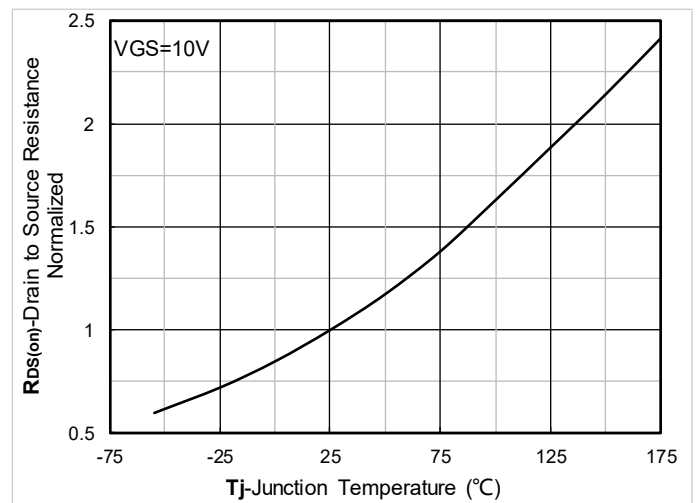


Figure6. Normalized On-Resistance



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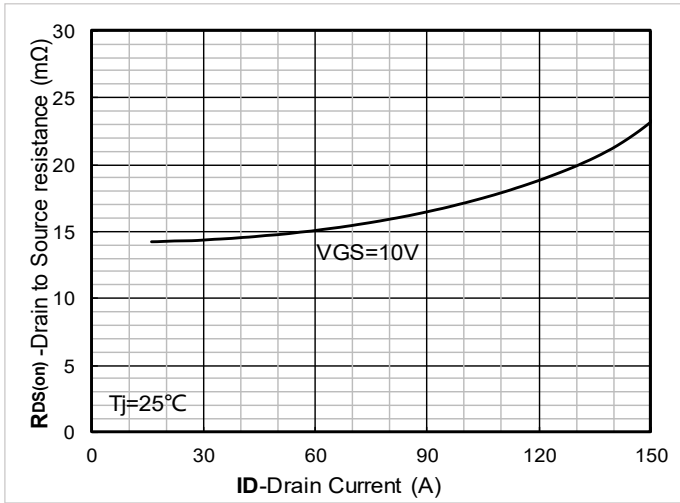


Figure7. RDS(on) VS Drain Current

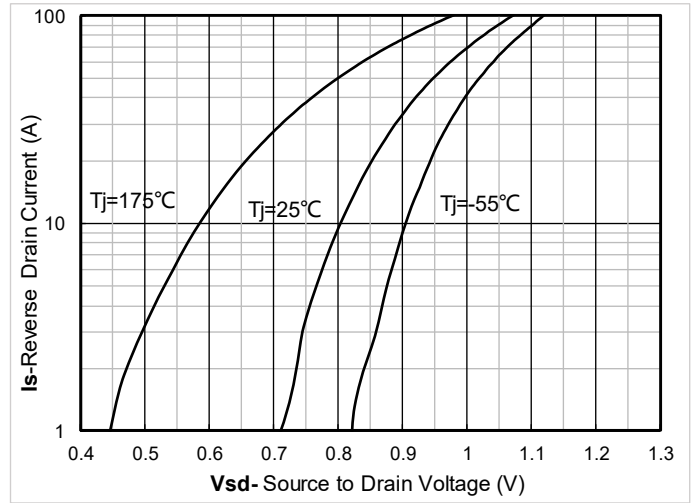


Figure8. Forward characteristics of reverse diode

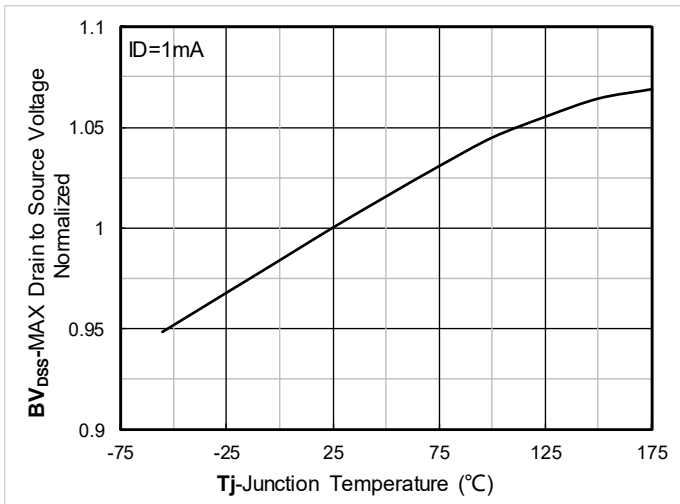


Figure9. Normalized breakdown voltage

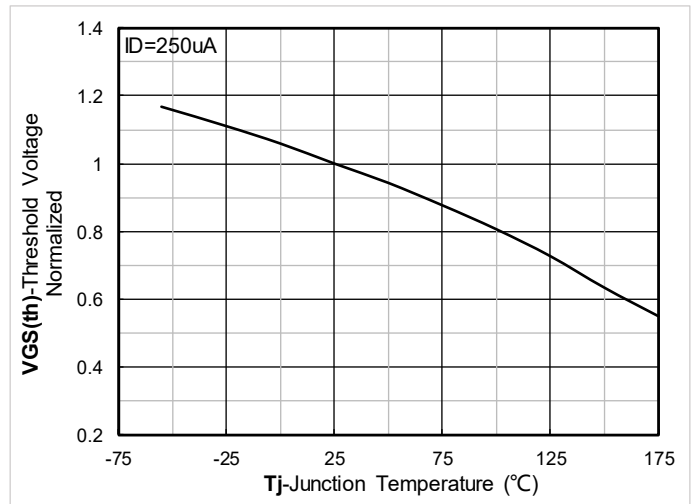


Figure10. Normalized Threshold voltage

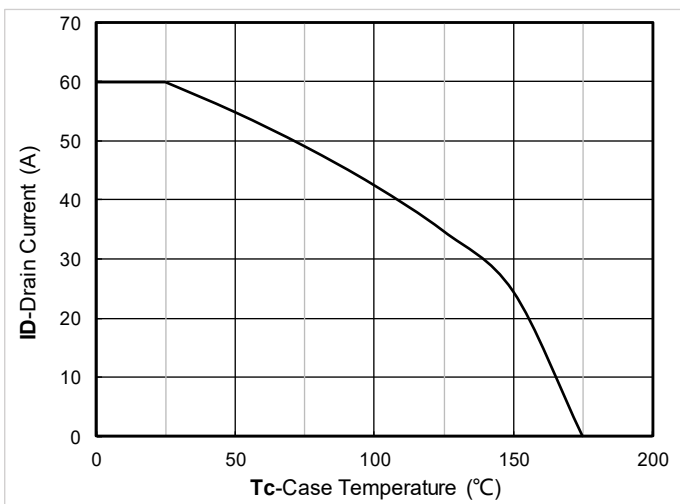


Figure11. Current dissipation

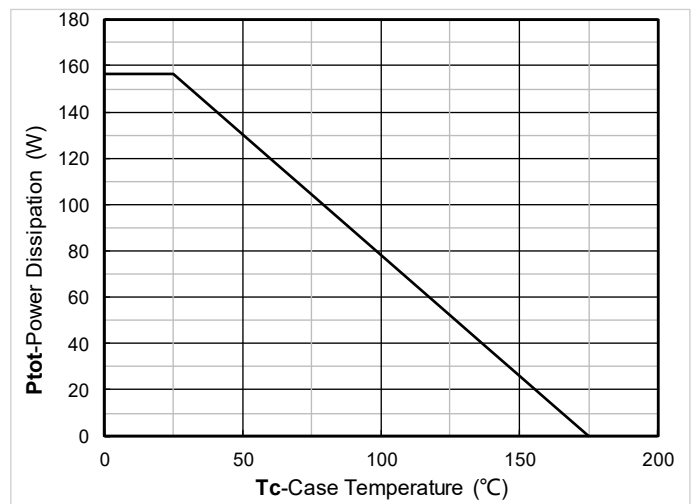


Figure12. Power dissipation



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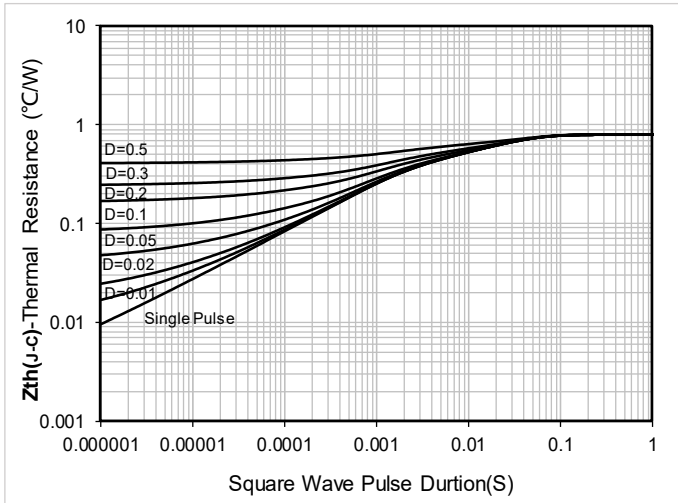


Figure13. Maximum Transient Thermal Impedance

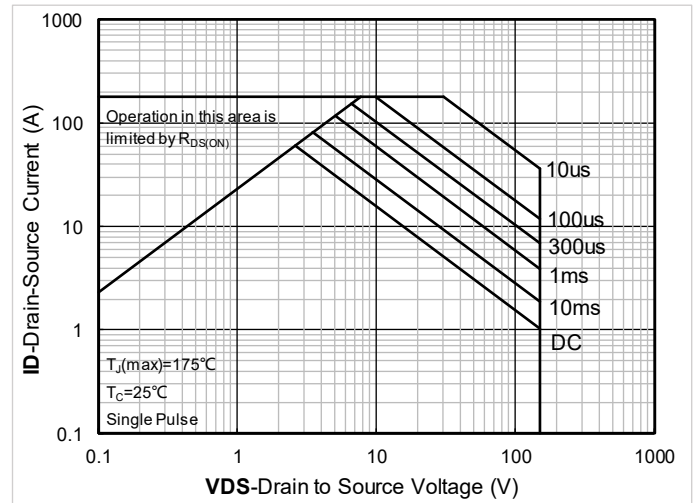
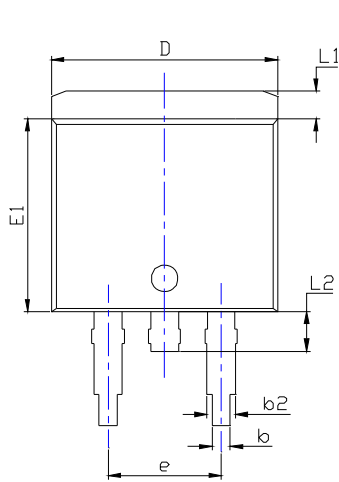


Figure14. Safe Operation Area

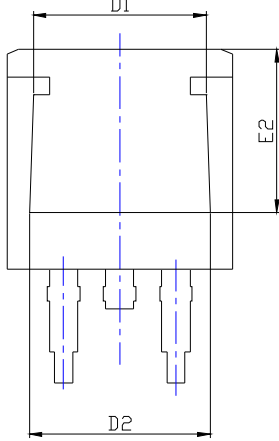


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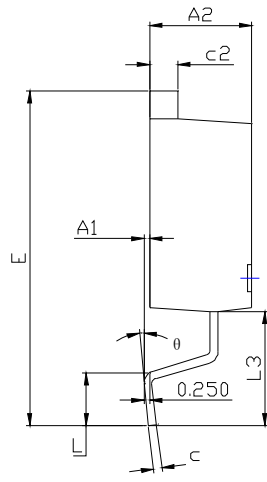
## TO-263-HY Package information



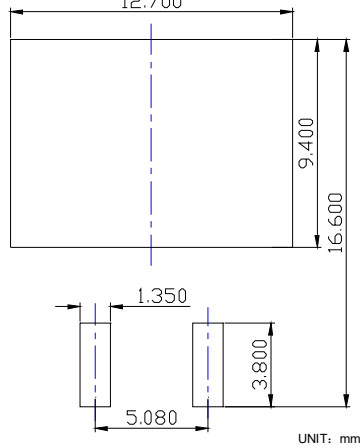
TOP VIEW



BOTTOM VIEW



SIDE VIEW



SUGGESTED SOLDER PAD LAYOUT

UNIT: mm

SYMBOL	DIMENSIONS					
	INCHES			Millimeter		
	MIN.	NDM.	MAX.	MIN.	NDM.	MAX.
A1	0.000	---	0.010	0.000	---	0.250
A2	0.174	0.180	0.186	4.430	4.580	4.730
b	0.028	0.032	0.036	0.720	0.820	0.920
b2	0.046	0.050	0.054	1.180	1.280	1.380
c	0.013	0.015	0.018	0.330	0.390	0.450
c2	0.048	0.050	0.053	1.220	1.280	1.340
D	0.394	0.400	0.406	10.000	10.150	10.300
D1	0.295	0.307	0.319	7.500	7.800	8.100
D2	0.303	0.315	0.327	7.700	8.000	8.300
E	0.571	0.591	0.610	14.500	15.000	15.500
E1	0.337	0.341	0.348	8.550	8.700	8.850
E2	0.276	0.287	0.299	7.000	7.300	7.600
e	0.200BSC			5.080BSC		
L	0.070	---	0.110	1.790	---	2.790
L1	0.044	---	0.056	1.120	---	1.420
L2	0.030	---	0.070	0.770	---	1.770
L3	0.197REF			5.000REF		
θ	0°	---	8°	0°	---	8°

**NOTE:**

- 1.PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
- 2.TOLERANCE 0.1mm UNLESS OTHERWISE SPECIFIED.
- 3.THE PAD LAYOUT IS FOR REFERENCE PURPOSES ONLY.



## YJB60G15HQ

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