

**• General Description**

The AGM40P35C combines advanced trench MOSFET technology with a low resistance package to provide extremely low  $R_{DS(ON)}$ . This device is ideal for load switch and battery protection applications.

**• Features**

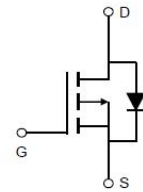
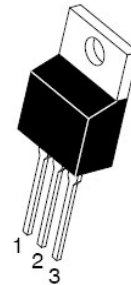
- Advance high cell density Trench technology
- Low  $R_{DS(ON)}$  to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance

**• Application**

- MB/VGA Vcore
- SMPS 2<sup>nd</sup> Synchronous Rectifier
- POL application
- BLDC Motor driver

**Product Summary**

BVDSS	RDSON	ID
-40V	11mΩ	-60A

**TO-220 Pin Configuration**

**Package Marking and Ordering Information**

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AGM40P35C	AGM40P35C	TO-220AB	----	----	1000

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	-60	A
Drain Current-Continuous( $T_C=100^{\circ}\text{C}$ )	$I_D(100^{\circ}\text{C})$	-38	A
Pulsed Drain Current	$I_{DM}$	-160	A
Maximum Power Dissipation $T_C=25^{\circ}\text{C}$	$P_D$	80	W
Derating factor		0.53	W/ $^{\circ}\text{C}$
Single pulse avalanche energy <sup>(Note 5)</sup>	$E_{AS}$	544	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 175	$^{\circ}\text{C}$

**Thermal Characteristic**

Thermal Resistance,Junction-to-Case <sup>(Note 2)</sup>	$R_{\theta JC}$	1.88	$^{\circ}\text{C}/\text{W}$
Thermal Resistance,Junction-to-Case <sup>(Note 2)</sup>	$R_{\theta JA}$	1.88	$^{\circ}\text{C}/\text{W}$

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-40	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-40V, V_{GS}=0V$	-	-	-1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.5	-1.7	-2.5	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-12A$	-	11	14	m $\Omega$
		$V_{GS}=-4.5V, I_D=-12A$	-	18.5	24	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=-5V, I_D=-12A$	-	34	-	S
<b>Dynamic Characteristics</b> (Note 4)						
Input Capacitance	$C_{iss}$	$V_{DS}=-20V, V_{GS}=0V,$ $F=1.0MHz$	-	2960	-	PF
Output Capacitance	$C_{oss}$		-	370	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	310	-	PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-20V, I_D=-12A$ $V_{GS}=-10V, R_G=3\Omega$	-	10	-	nS
Turn-on Rise Time	$t_r$		-	18	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	38	-	nS
Turn-Off Fall Time	$t_f$		-	24	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=-20, I_D=-12A,$ $V_{GS}=-10V$	-	72	-	nC
Gate-Source Charge	$Q_{gs}$		-	14	-	nC
Gate-Drain Charge	$Q_{gd}$		-	15	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=-12A$	-	-	-1.2	V
Diode Forward Current	$I_S$		-	-	-60	A
Reverse Recovery Time	$t_{rr}$	$T_J = 25^\circ\text{C}, I_F = -12A$ $di/dt = -100A/\mu s$ (Note 3)	-	40	-	nS
Reverse Recovery Charge	$Q_{rr}$		-	42	-	nC
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

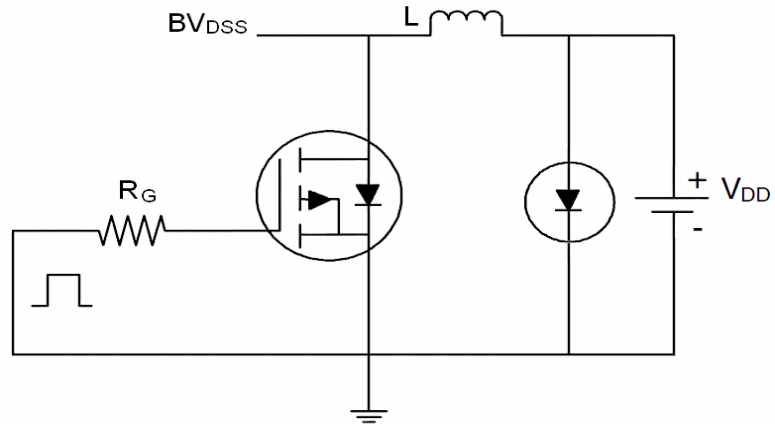
**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production

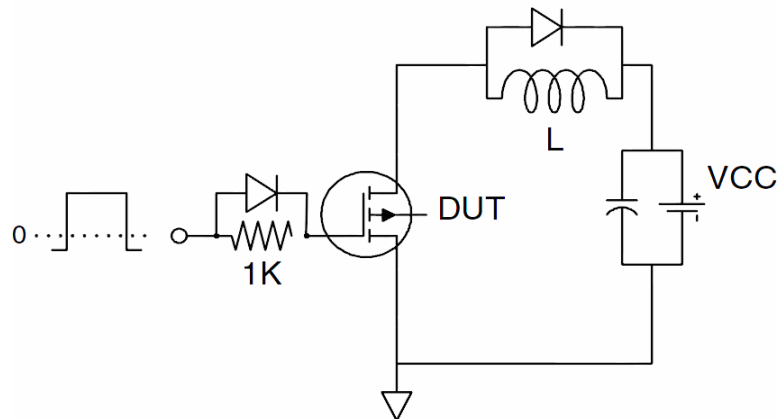
5.  $E_{AS}$  condition:  $T_J=25^\circ\text{C}, V_{DD}=-20V, V_G=-10V, L=1mH, R_G=25\Omega$

**Test Circuit**

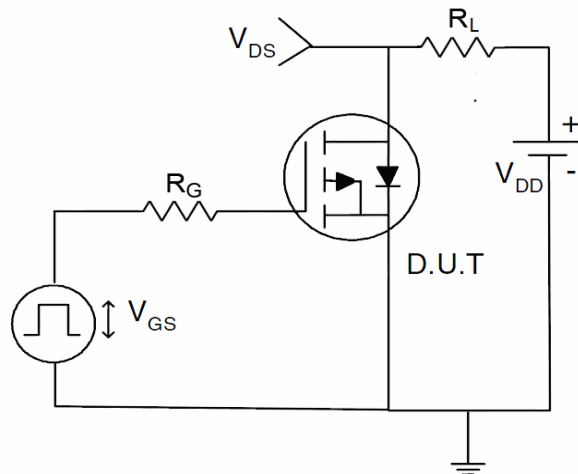
**1) E<sub>AS</sub> Test Circuit**



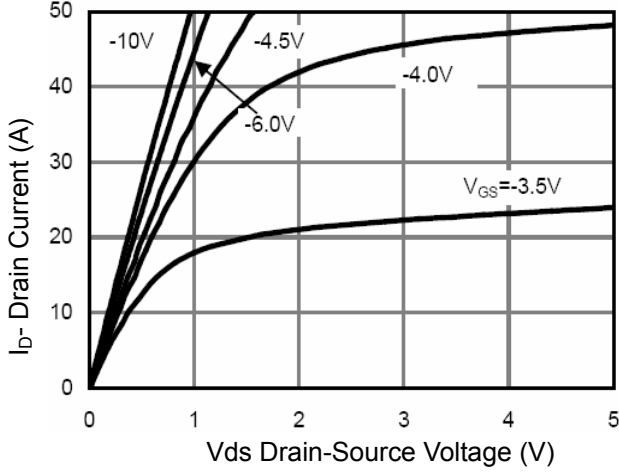
**2) Gate Charge Test Circuit**



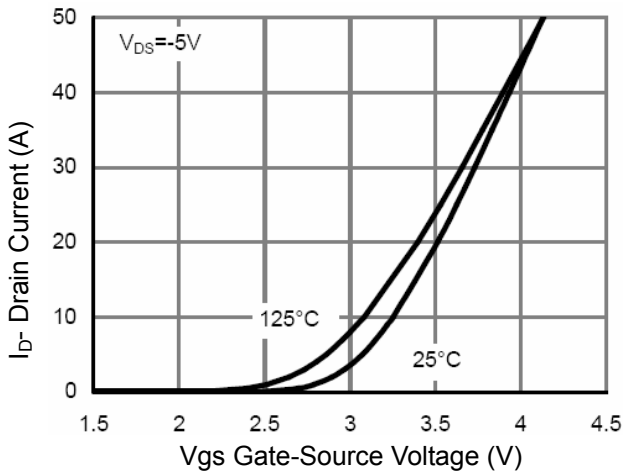
**3) Switch Time Test Circuit**



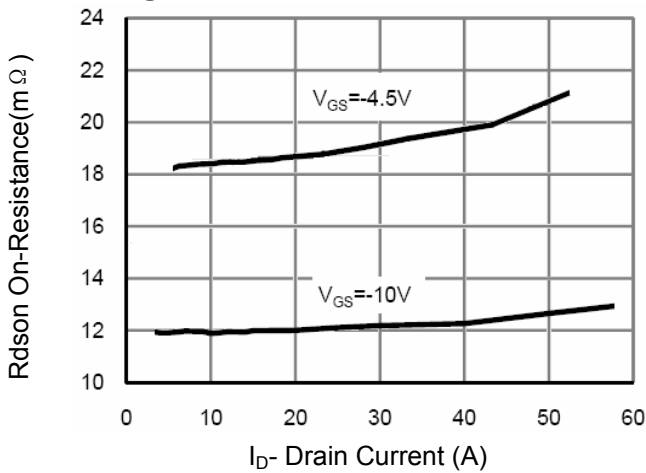
**Typical Electrical and Thermal Characteristics (Curves)**



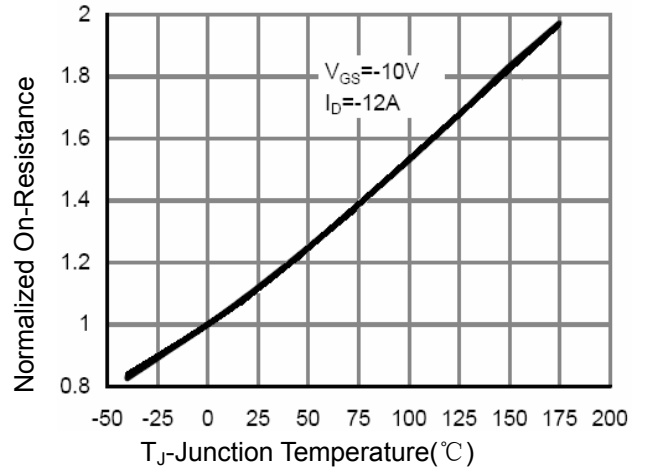
**Figure 1 Output Characteristics**



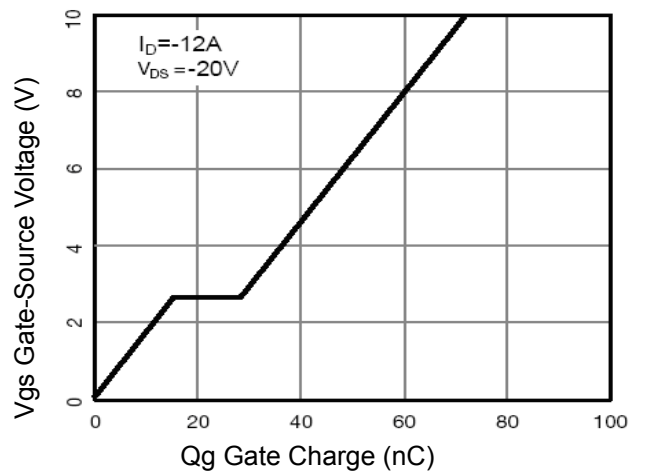
**Figure 2 Transfer Characteristics**



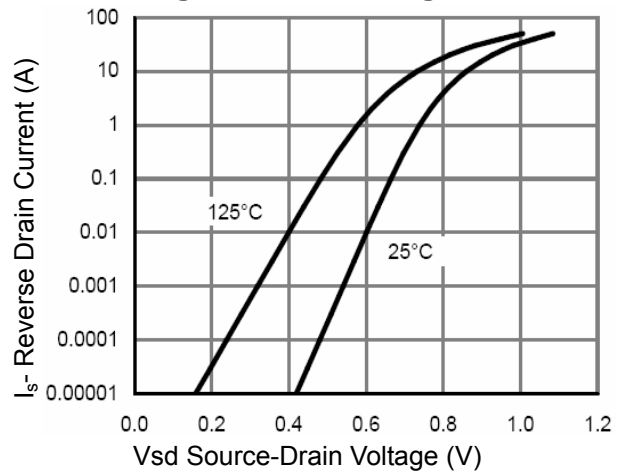
**Figure 3 Rds(on)- Drain Current**



**Figure 4 Rds(on)-Junction Temperature**



**Figure 5 Gate Charge**



**Figure 6 Source- Drain Diode Forward**

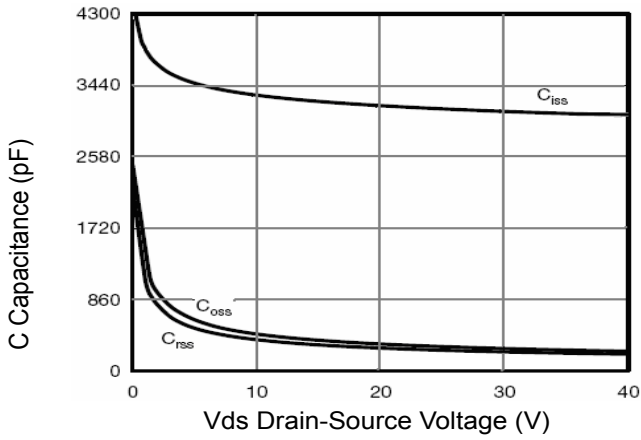


Figure 7 Capacitance vs Vds

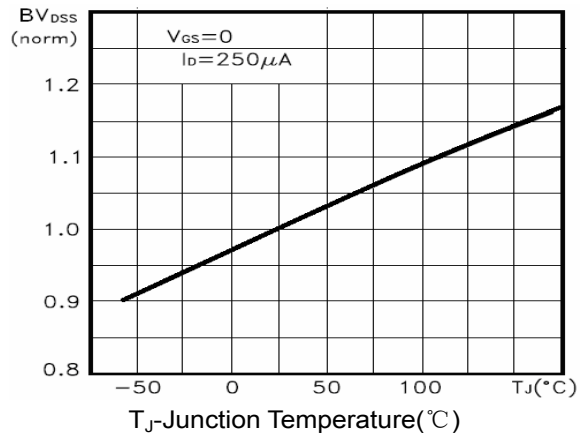


Figure 9  $BV_{DSS}$  vs Junction Temperature

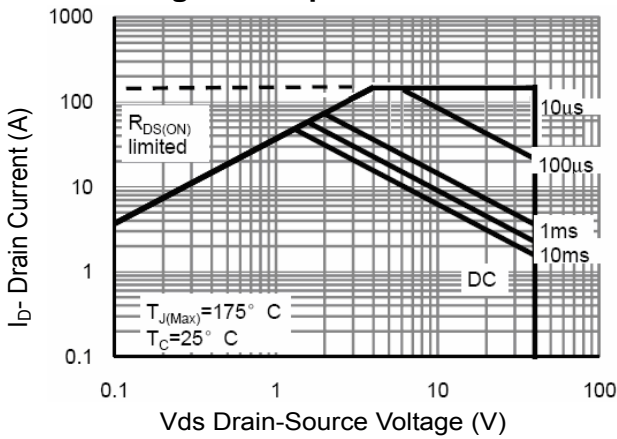


Figure 8 Safe Operation Area

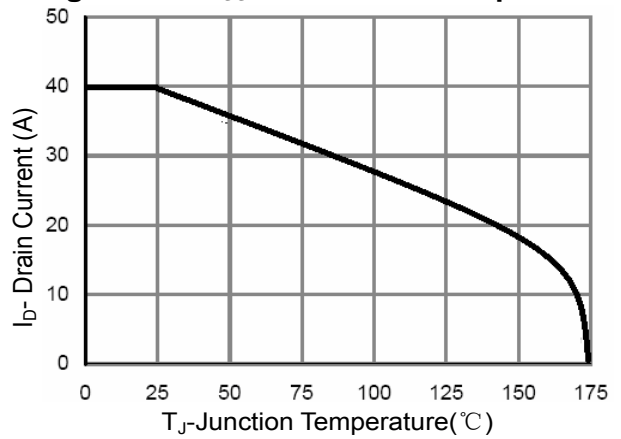


Figure 10  $I_D$  Current Derating vs Junction Temperature

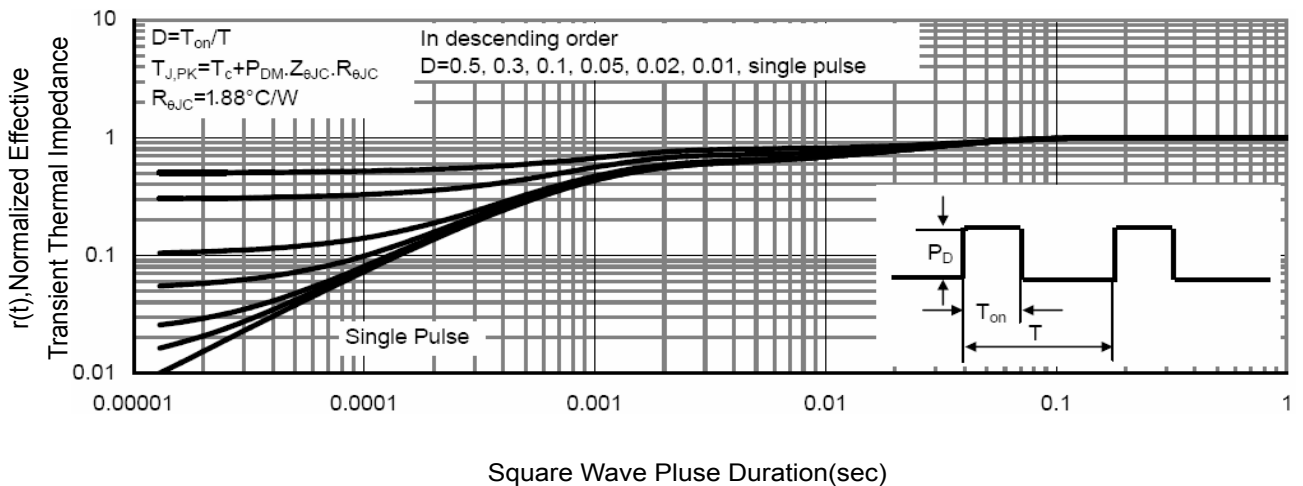
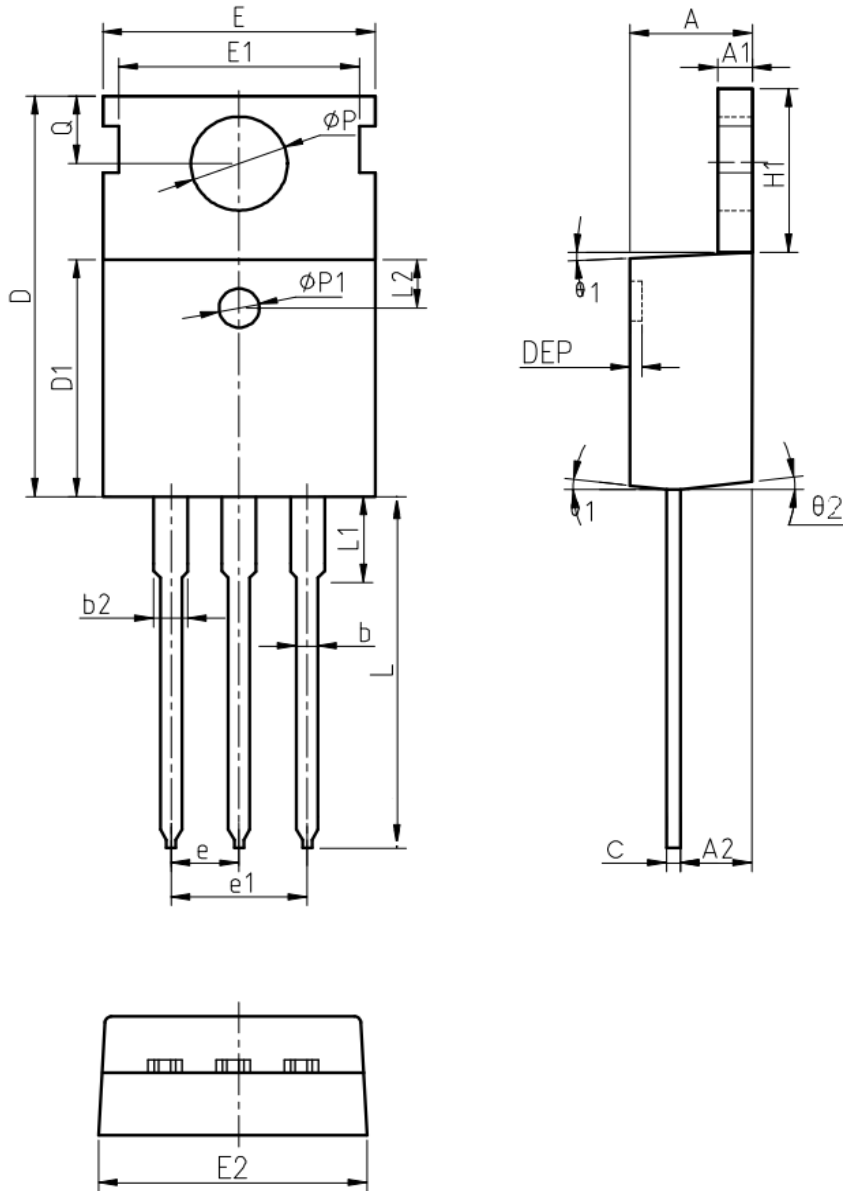


Figure 11 Normalized Maximum Transient Thermal Impedance

**TO-220AB Package Outline Data**


Symbol	Dimensions (unit: mm)		
	Min	Typ	Max
<b>A</b>	4.30	4.52	4.70
<b>A1</b>	1.15	1.30	1.40
<b>A2</b>	2.20	2.40	2.60
<b>b</b>	0.70	0.80	1.00
<b>b2</b>	1.17	1.32	1.50
<b>c</b>	0.45	0.50	0.61
<b>D</b>	15.30	15.65	15.90
<b>D1</b>	9.00	9.20	9.40
<b>DEP</b>	0.05	0.10	0.25
<b>E</b>	9.66	9.90	10.28
<b>E1</b>	-	8.70	-
<b>E2</b>	9.80	10.00	10.20
$\phi P1$	1.40	1.50	1.60
<b>e</b>	2.54 BSC		
<b>e1</b>	5.08 BSC		
<b>H1</b>	6.40	6.50	6.80
<b>L</b>	12.70	-	14.27
<b>L1</b>	-	-	3.95
<b>L2</b>	2.40	2.50	2.60
$\phi P$	3.53	3.60	3.70
<b>Q</b>	2.70	2.80	2.90
$\theta 1$	5 °	7 °	9 °
$\theta 2$	1 °	3 °	5 °

**Notes:**

1. Refer to JEDEC TO-220 variation AB
2. Dimension "D" and "E" do NOT include mold flash. Mold flash shall not exceed 0.127mm per side.


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