

## General Description

The HSP0026 is the high cell density trench N-ch MOSFETs, which provide excellent  $R_{DS(ON)}$  and gate charge for most of the synchronous buck converter applications.

The HSP0026 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

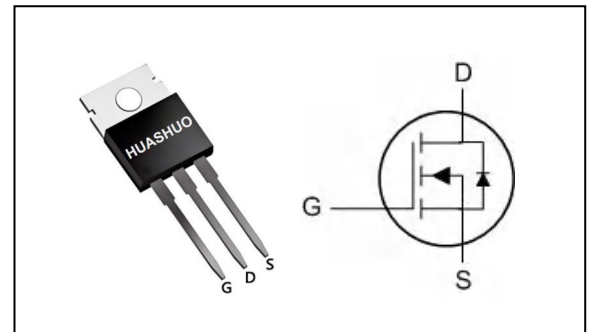
## Features

- Green Device Available
- Super Low Gate Charge
- Excellent  $C_{dv}/dt$  effect decline
- Advanced high cell density Trench Technology

## Product Summary

|                  |     |            |
|------------------|-----|------------|
| $V_{DS}$         | 100 | V          |
| $R_{DS(ON),typ}$ | 16  | m $\Omega$ |
| $I_D$            | 50  | A          |

## TO-220 Pin Configuration



## Absolute Maximum Ratings

| Symbol                     | Parameter                                  | Rating     | Units            |
|----------------------------|--------------------------------------------|------------|------------------|
| $V_{DS}$                   | Drain-Source Voltage                       | 100        | V                |
| $V_{GS}$                   | Gate-Source Voltage                        | $\pm 20$   | V                |
| $I_D@T_C=25^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 50         | A                |
| $I_D@T_C=70^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 22         | A                |
| $I_{DM}$                   | Pulsed Drain Current <sup>2</sup>          | 75         | A                |
| EAS                        | Single Pulse Avalanche Energy <sup>3</sup> | 780        | mJ               |
| $I_{AS}$                   | Avalanche Current                          | 18         | A                |
| $P_D@T_C=25^\circ\text{C}$ | Total Power Dissipation <sup>4</sup>       | 62.5       | W                |
| $T_{STG}$                  | Storage Temperature Range                  | -55 to 150 | $^\circ\text{C}$ |
| $T_J$                      | Operating Junction Temperature Range       | -55 to 150 | $^\circ\text{C}$ |

## Thermal Data

| Symbol          | Parameter                                                         | Typ. | Max. | Unit               |
|-----------------|-------------------------------------------------------------------|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient <sup>1</sup> ( $t \leq 10S$ ) | ---  | 50   | $^\circ\text{C}/W$ |
|                 | Thermal Resistance Junction-ambient <sup>1</sup> (Steady State)   | ---  | 2    | $^\circ\text{C}/W$ |



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

| Symbol                              | Parameter                                      | Conditions                                                                             | Min. | Typ. | Max. | Unit  |
|-------------------------------------|------------------------------------------------|----------------------------------------------------------------------------------------|------|------|------|-------|
| BV <sub>DSS</sub>                   | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA                                             | 100  | ---  | ---  | V     |
| ΔBV <sub>DSS</sub> /ΔT <sub>J</sub> | BVDSS Temperature Coefficient                  | Reference to 25°C, I <sub>D</sub> =1mA                                                 | ---  | 0.08 | ---  | V/°C  |
| R <sub>DS(ON)</sub>                 | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =9A                                               | ---  | 16   | 22   | mΩ    |
|                                     |                                                | V <sub>GS</sub> =4.5V, I <sub>D</sub> =7A                                              | ---  | 20   | 28   |       |
| V <sub>GS(th)</sub>                 | Gate Threshold Voltage                         | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA                               | 1.2  | 2.0  | 2.5  | V     |
| ΔV <sub>GS(th)</sub>                | V <sub>GS(th)</sub> Temperature Coefficient    |                                                                                        | ---  | -5.5 | ---  | mV/°C |
| I <sub>DSS</sub>                    | Drain-Source Leakage Current                   | V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C                        | ---  | ---  | 10   | uA    |
|                                     |                                                | V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C                        | ---  | ---  | 100  |       |
| I <sub>GSS</sub>                    | Gate-Source Leakage Current                    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                             | ---  | ---  | ±100 | nA    |
| g <sub>fs</sub>                     | Forward Transconductance                       | V <sub>DS</sub> =5V, I <sub>D</sub> =9A                                                | ---  | 28   | ---  | S     |
| R <sub>g</sub>                      | Gate Resistance                                | V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz                                       | ---  | 1.6  | ---  | Ω     |
| Q <sub>g</sub>                      | Total Gate Charge (10V)                        | V <sub>DS</sub> =80V, V <sub>GS</sub> =10V, I <sub>D</sub> =7A                         | ---  | 36   | ---  | nC    |
| Q <sub>gs</sub>                     | Gate-Source Charge                             |                                                                                        | ---  | 5    | ---  |       |
| Q <sub>gd</sub>                     | Gate-Drain Charge                              |                                                                                        | ---  | 10   | ---  |       |
| T <sub>d(on)</sub>                  | Turn-On Delay Time                             | V <sub>DD</sub> =50V, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3Ω<br>I <sub>D</sub> =7A | ---  | 11.5 | ---  | ns    |
| T <sub>r</sub>                      | Rise Time                                      |                                                                                        | ---  | 29   | ---  |       |
| T <sub>d(off)</sub>                 | Turn-Off Delay Time                            |                                                                                        | ---  | 42   | ---  |       |
| T <sub>f</sub>                      | Fall Time                                      |                                                                                        | ---  | 18   | ---  |       |
| C <sub>iss</sub>                    | Input Capacitance                              | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz                                      | ---  | 1930 | ---  | pF    |
| C <sub>oss</sub>                    | Output Capacitance                             |                                                                                        | ---  | 245  | ---  |       |
| C <sub>rss</sub>                    | Reverse Transfer Capacitance                   |                                                                                        | ---  | 125  | ---  |       |

**Diode Characteristics**

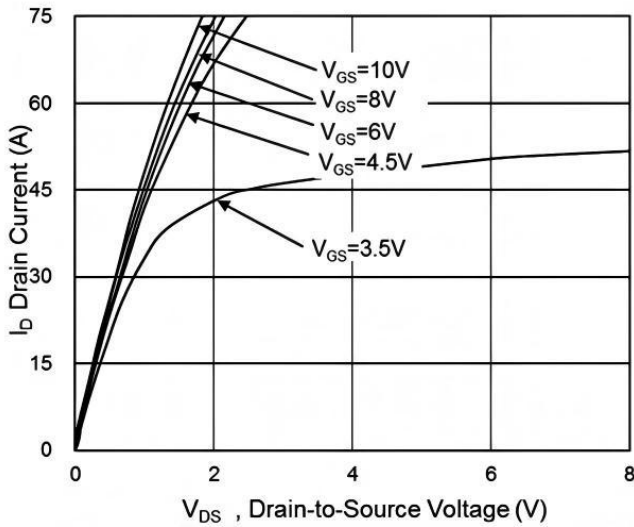
| Symbol          | Parameter                                | Conditions                                                    | Min. | Typ. | Max. | Unit |
|-----------------|------------------------------------------|---------------------------------------------------------------|------|------|------|------|
| I <sub>S</sub>  | Continuous Source Current <sup>1,6</sup> | V <sub>G</sub> =V <sub>D</sub> =0V, Force Current             | ---  | ---  | 50   | A    |
| V <sub>SD</sub> | Diode Forward Voltage <sup>2</sup>       | V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C | ---  | ---  | 1.2  | V    |
| t <sub>rr</sub> | Reverse Recovery Time                    | IF=7A, dI/dt=100A/μs, T <sub>J</sub> =25°C                    | ---  | 48   | ---  | nS   |
| Q <sub>rr</sub> | Reverse Recovery Charge                  |                                                               | ---  | 29   | ---  | nC   |

Note :

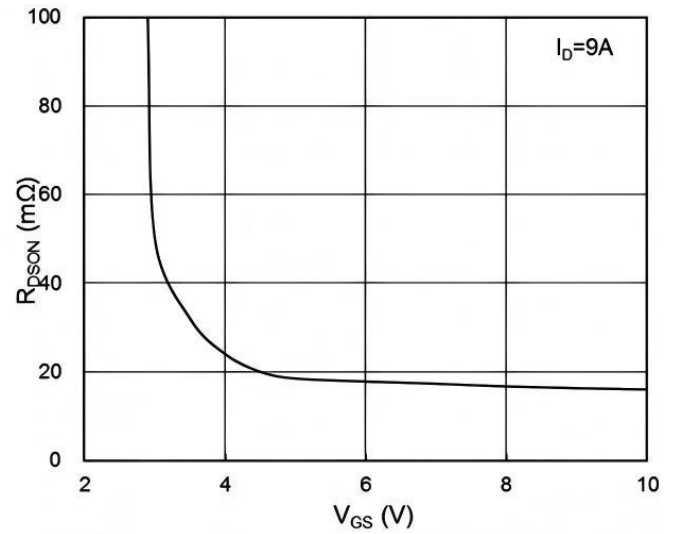
- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=25V,V<sub>GS</sub>=10V,L=0.1mH
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.



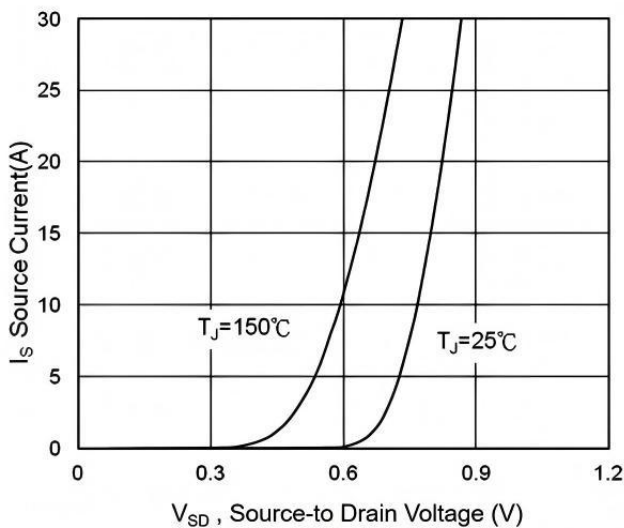
**Typical Characteristics**



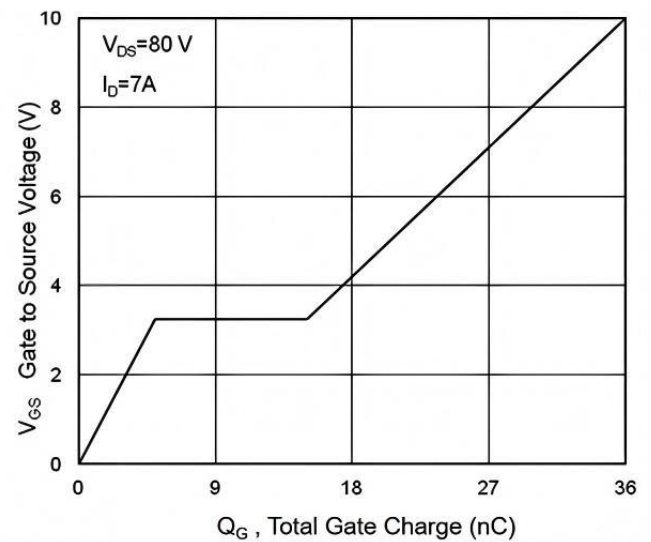
**Fig.1 Typical Output Characteristics**



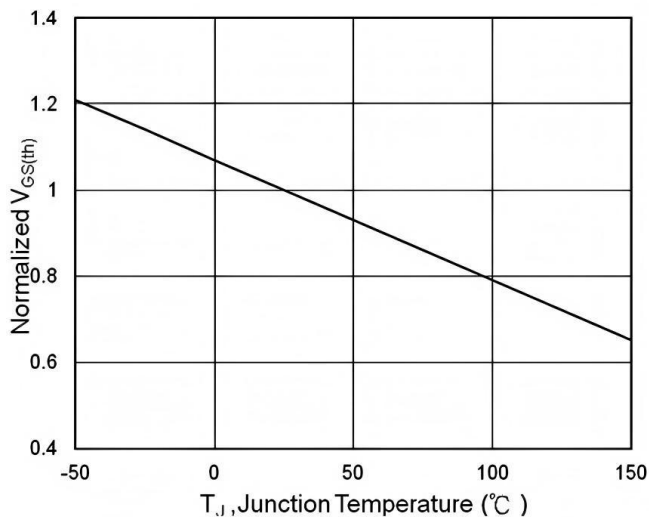
**Fig.2 On-Resistance vs. Gate-Source**



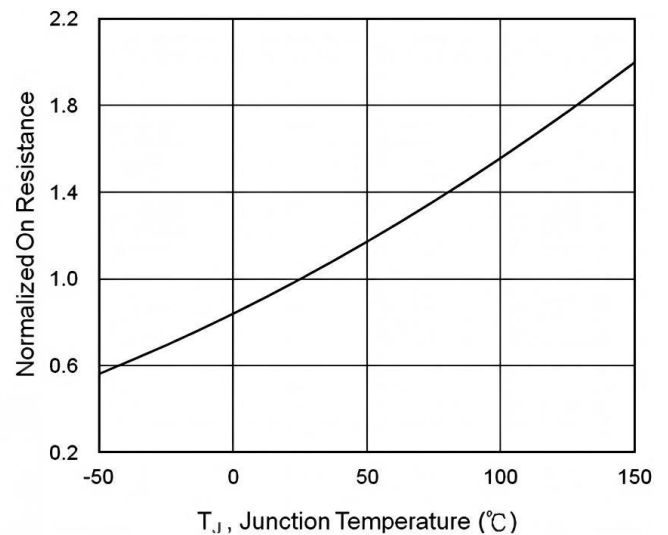
**Fig.3 Forward Characteristics Of Reverse diode**



**Fig.4 Gate-Charge Characteristics**



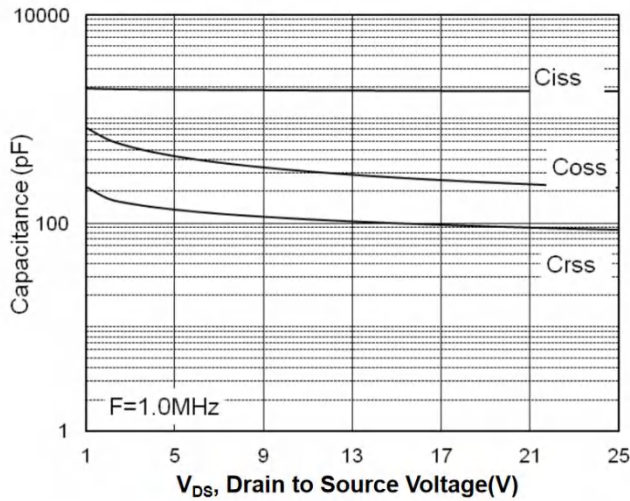
**Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$**



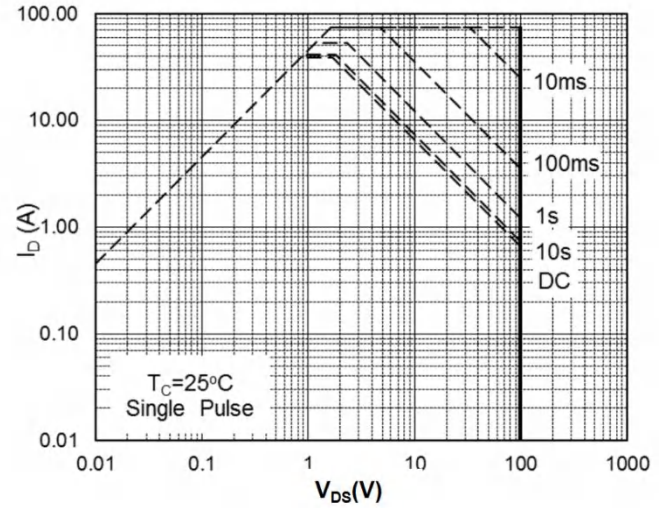
**Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$**



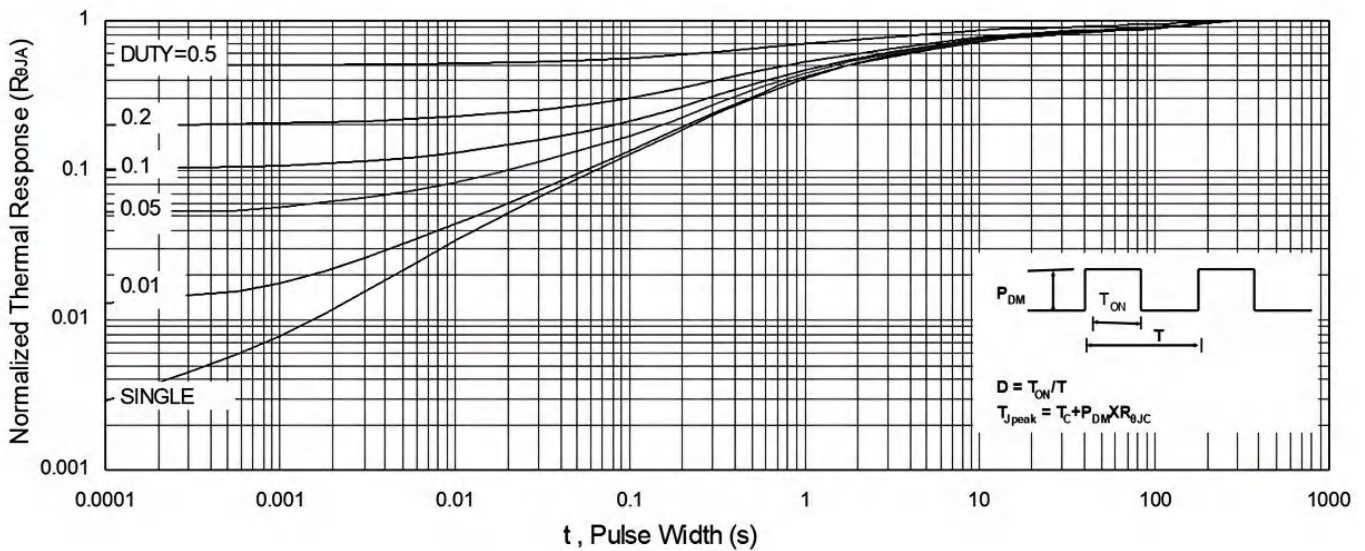
**N-Ch 100V Fast Switching MOSFETs**



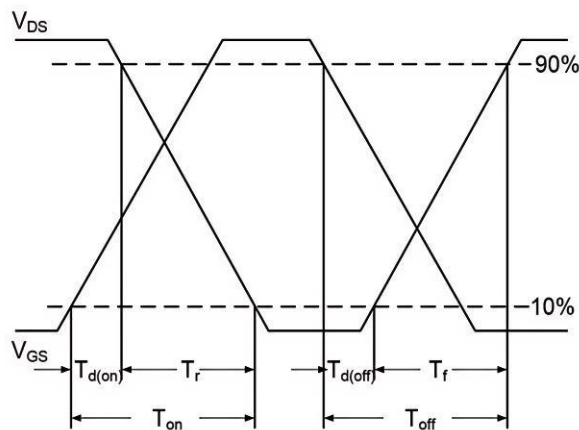
**Fig.7 Capacitance**



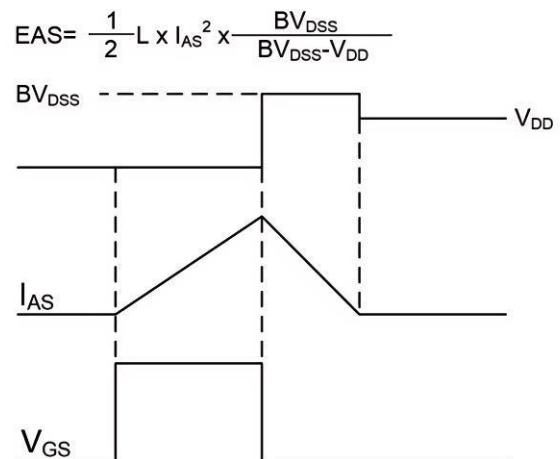
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**



**Fig.10 Switching Time Waveform**



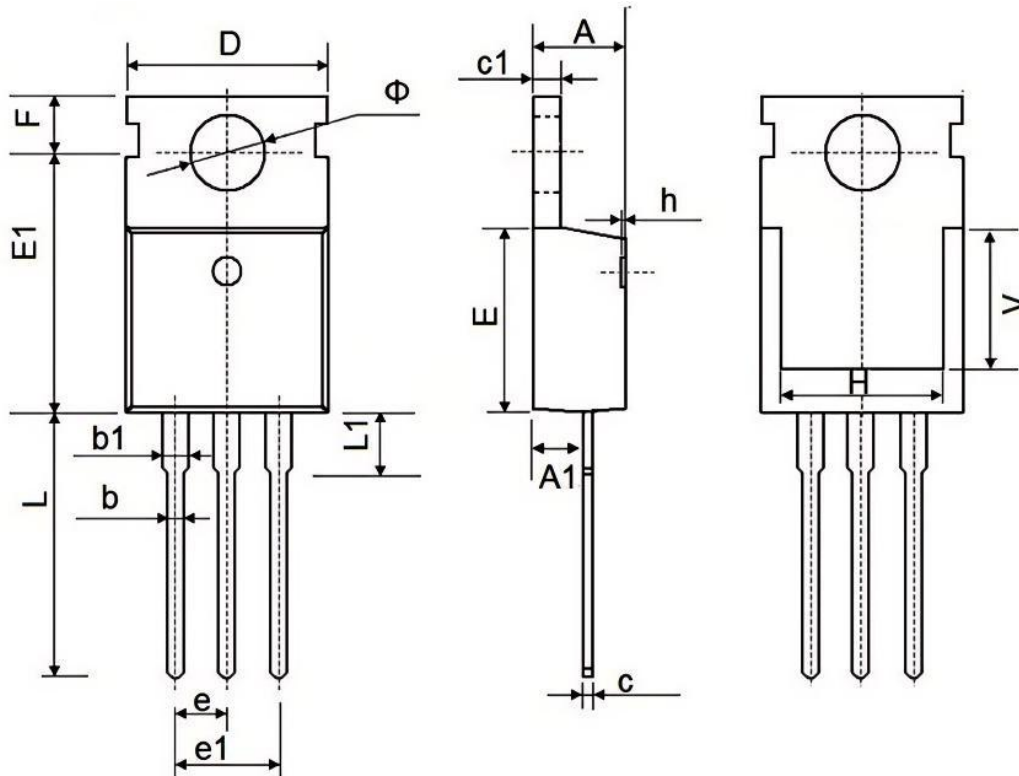
**Fig.11 Unclamped Inductive Switching Waveform**



## Ordering Information

| Part Number | Package code | Packaging |
|-------------|--------------|-----------|
| HSP0026     | TO-220       | 1000/Box  |

**TO-220 Package Outline**



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 4.300                     | 4.700  | 0.169                | 0.185 |
| A1     | 2.200                     | 2.600  | 0.087                | 0.102 |
| b      | 0.700                     | 0.950  | 0.028                | 0.037 |
| b1     | 1.170                     | 1.410  | 0.046                | 0.056 |
| C      | 0.450                     | 0.650  | 0.018                | 0.026 |
| c1     | 1.200                     | 1.400  | 0.047                | 0.055 |
| D      | 9.600                     | 10.400 | 0.378                | 0.409 |
| E      | 8.8500                    | 9.750  | 0.348                | 0.384 |
| E1     | 12.650                    | 12.950 | 0.498                | 0.510 |
| e      | 2.540 TYP.                |        | 0.100TYP.            |       |
| e1     | 4.980                     | 5.180  | 0.196                | 0.204 |
| F      | 2.650                     | 2.950  | 0.104                | 0.116 |
| H      | 7.900                     | 8.100  | 0.311                | 0.319 |
| h      | 0.000                     | 0.300  | 0.000                | 0.012 |
| L      | 12.750                    | 14.300 | 0.502                | 0.563 |
| L1     | 2.850                     | 3.950  | 0.112                | 0.156 |
| V      | 7.500 REF.                |        | 0.295 REF.           |       |
| Φ      | 3.400                     | 4.000  | 0.134                | 0.157 |



## HSP0026 Marking:

