



General Description

The HSP40P15 uses advanced trench MOSFET technology to provide excellent $R_{DS(ON)}$ and gate charge for use in a wide variety of other applications.

The HSP40P15 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

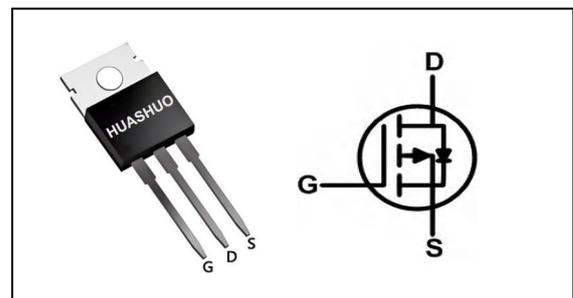
Features

- 100% EAS Guaranteed
- Green Device Available
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Advanced high cell density Trench Technology

Product Summary

| | | |
|------------------|------|------------|
| V_{DS} | -150 | V |
| $R_{DS(ON),typ}$ | 85 | m Ω |
| I_D | -40 | A |

TO-220 Pin Configuration



Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|-----------------------|---|------------|------------|
| V_{DS} | Drain-Source Voltage | -150 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| $I_D@T_C=25^\circ C$ | Continuous Drain Current, $V_{GS} @ -10V^1$ | -40 | A |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current, $V_{GS} @ -10V^1$ | -23 | A |
| I_{DM} | Pulsed Drain Current ² | -120 | A |
| EAS | Single Pulse Avalanche Energy ³ | 420 | mJ |
| I_{AS} | Avalanche Current | -35 | A |
| $P_D@T_C=25^\circ C$ | Total Power Dissipation ⁴ | 100 | W |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ C$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ C$ |

Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|--|------|------|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient ¹ | --- | 62 | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ¹ | --- | 1.3 | $^\circ C/W$ |



Electrical Characteristics (T_J=25 °C, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---------------------|--|---|------|-------|------|------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =-250uA | -150 | --- | --- | V |
| R _{DS(ON)} | Static Drain-Source On-Resistance ² | V _{GS} =-10V, I _D =-15A | --- | 85 | 100 | mΩ |
| R _{DS(ON)} | Static Drain-Source On-Resistance ² | V _{GS} =-4.5V, I _D =-10A | --- | 90 | 110 | mΩ |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =-250uA | -1 | -1.65 | -2.5 | V |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =-150V, V _{GS} =0V, T _J =25°C | --- | --- | -1 | uA |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =-150V, V _{GS} =0V, T _J =125°C | --- | --- | -100 | uA |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±20V, V _{DS} =0V | --- | --- | ±100 | nA |
| g _{fs} | Forward Transconductance | V _{DS} =-5V, I _D =-15A | --- | 44 | --- | S |
| R _g | Gate Resistance | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 1.6 | --- | Ω |
| Q _g | Total Gate Charge | V _{DS} =-75V, V _{GS} =-10V, I _D =-15A | --- | 120 | --- | nC |
| Q _{gs} | Gate-Source Charge | | --- | 21 | --- | |
| Q _{gd} | Gate-Drain Charge | | --- | 25 | --- | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =-75V, V _{GS} =-10V, R _G =6Ω, I _D =-15A | --- | 17 | --- | ns |
| T _r | Rise Time | | --- | 89 | --- | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 49 | --- | |
| T _f | Fall Time | | --- | 60 | --- | |
| C _{iss} | Input Capacitance | V _{DS} =-75V, V _{GS} =0V, f=1MHz | --- | 8600 | --- | pF |
| C _{oss} | Output Capacitance | | --- | 155 | --- | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 116 | --- | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|--|--|------|------|------|------|
| I _S | Continuous Source Current ^{1,5} | V _G =V _D =0V, Force Current | --- | --- | -40 | A |
| V _{SD} | Diode Forward Voltage ² | V _{GS} =0V, I _S =-1A, T _J =25°C | --- | --- | -1.2 | V |

Note :

- 1.The data tested by surface mounted on a 1 inch² 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_{DD}=-75V,V_{GS}=-10V,L=0.1mH,I_{AS}=-35A
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.



Typical Characteristics

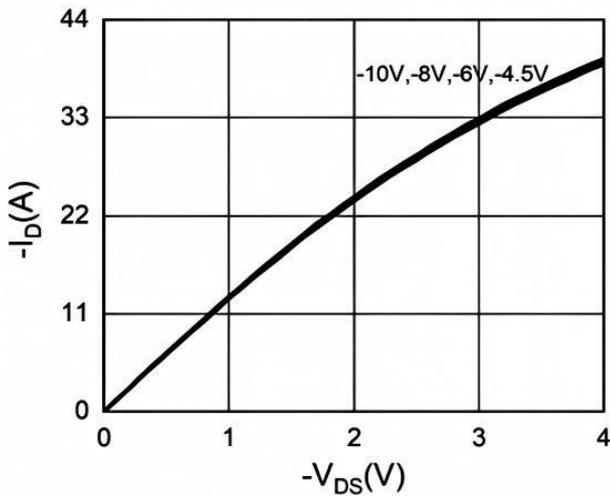


Fig.1 Typical Output Characteristics

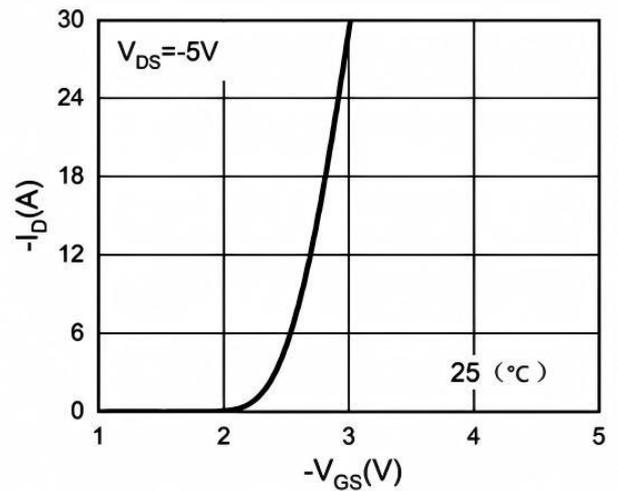


Fig.2 Transfer Characteristics

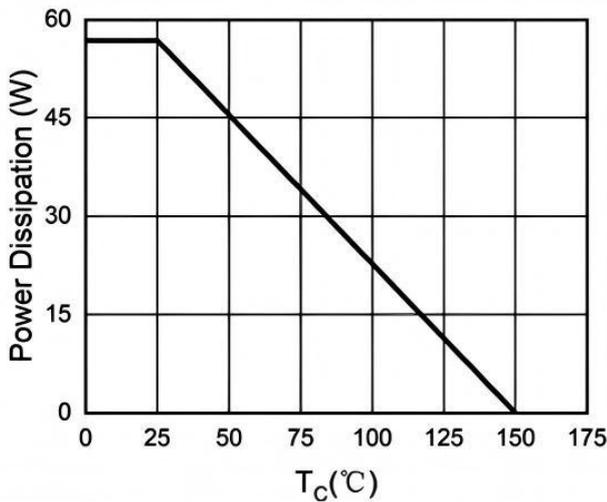


Fig.3 Power Dissipation

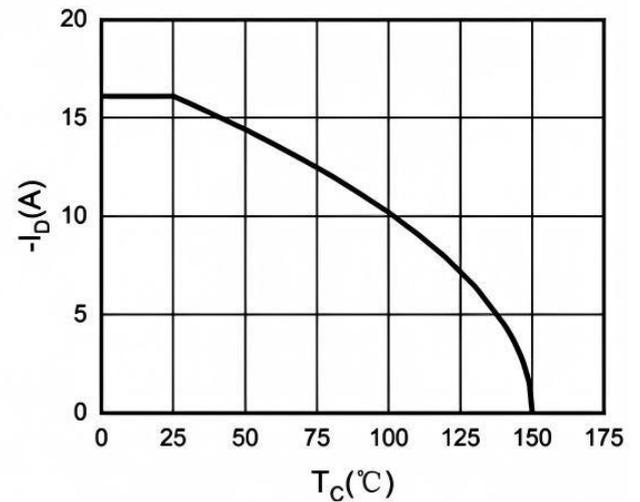


Fig.4 Drain Current

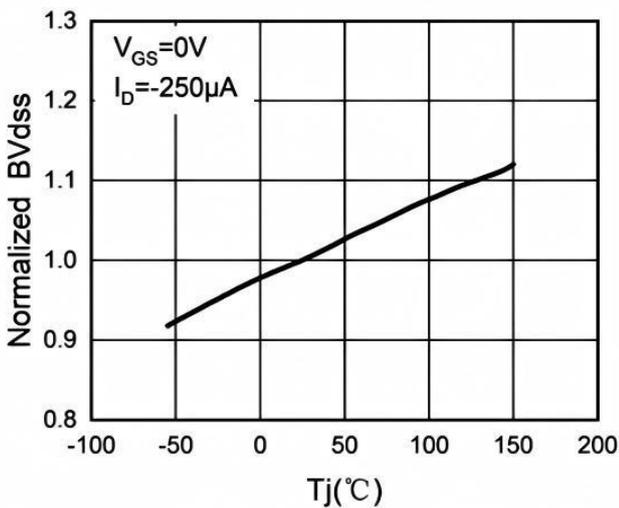


Fig.5 BV_{DS} vs Junction Temperature

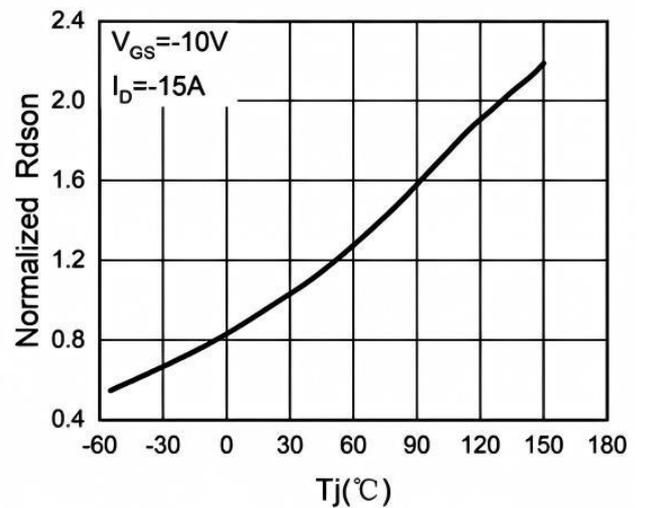


Fig.6 $R_{DS(on)}$ vs Junction Temperature



P-Ch 150V Fast Switching MOSFETs

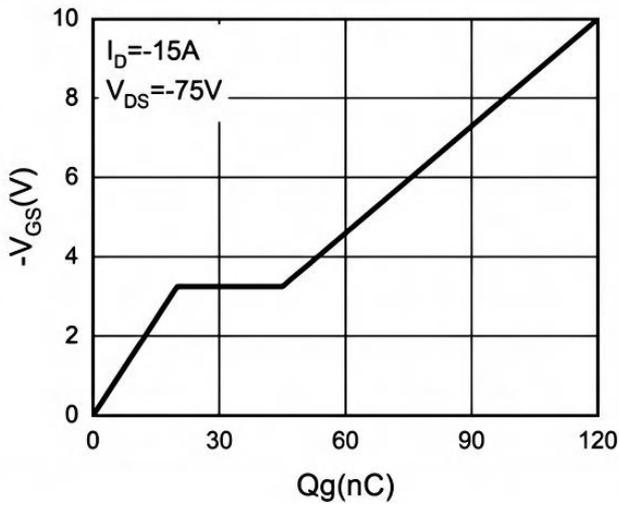


Fig.7 Gate Charge Waveforms

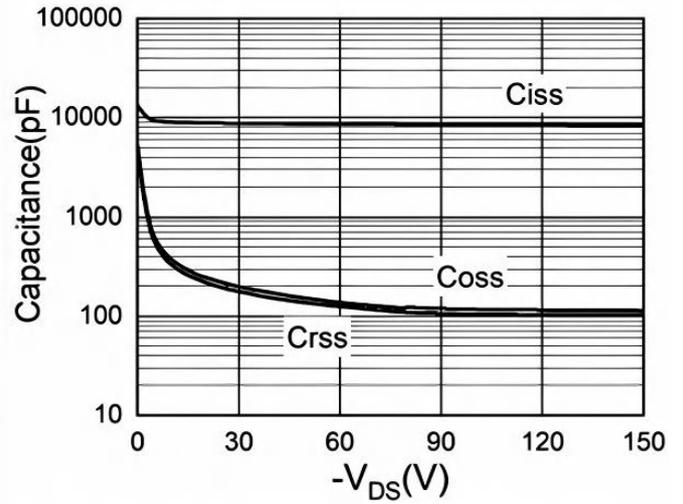


Fig.8 Capacitance

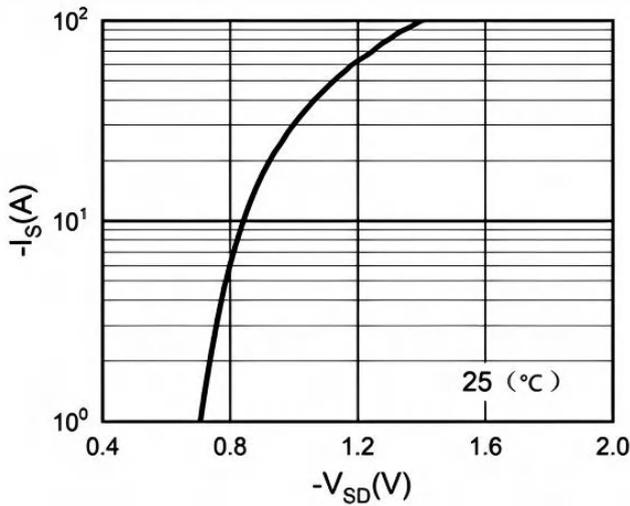


Fig.9 Body Diode Characteristics

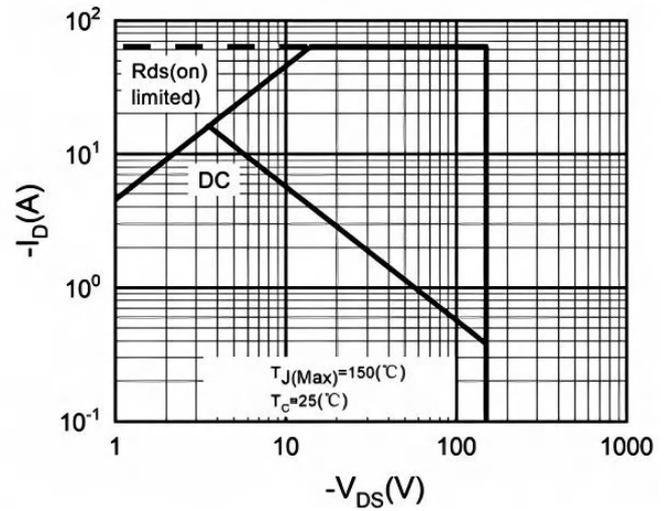


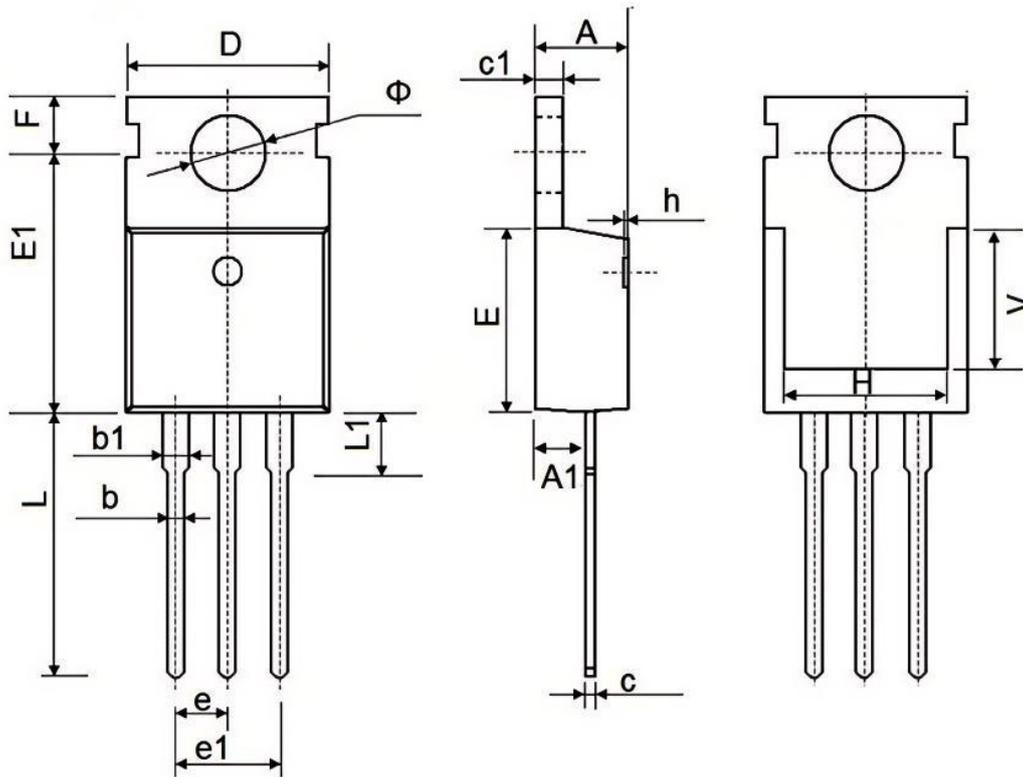
Fig.10 Maximum Safe Operating Area



Ordering Information

| | | |
|-------------|--------------|-----------|
| Part Number | Package code | Packaging |
| HSP40P15 | 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 |



HSP40P15 Marking:

