



## Features

- Wide bandgap SiC MOSFET technology
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed switching
- Low reverse recovery(Qrr)
- Halogen free, RoHs compliant

## Benefits

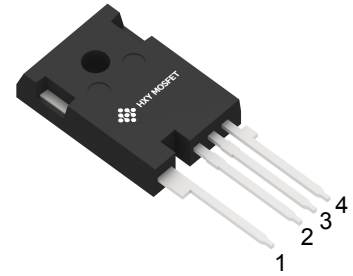
- Reduce switching losses
- Increased system Switching Frequency
- Increased power density
- Reduction of heat sink requirements

## Applications

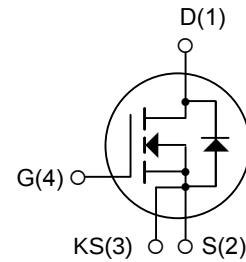
- Switch mode power supplies
- Renewable energy
- On Board Charger
- High Voltage DC/DC Converters



| Ordering Part Number | Package    | Brand      |
|----------------------|------------|------------|
| SCT3080ARC14         | TO-247H-4L | HXY MOSFET |



TO-247H-4L



## Maximum Ratings ( $T_c = 25^\circ\text{C}$ unless otherwise specified)

| Symbol        | Parameter                       | Test conditions                                   | Value   | Unit             | Note    |
|---------------|---------------------------------|---------------------------------------------------|---------|------------------|---------|
| $V_{DSmax}$   | Drain-Source Voltage            | $V_{GS} = 0V, I_D = 100\mu A$                     | 650     | V                |         |
| $V_{GS}$      | Gate-Source voltage (transient) | $t_p \leq 500ns, \text{duty cycle} \leq 1\%$      | -8/+20  | V                |         |
| $V_{GSop}$    | Recommend Gate-Source Voltage   | Static                                            | -4/+18  | V                |         |
| $I_D$         | Continuous Drain current        | $V_{GS} = 18V, T_c = 25^\circ\text{C}$            | 36      | A                | Fig. 14 |
|               |                                 | $V_{GS} = 18V, T_c = 100^\circ\text{C}$           | 25      |                  |         |
| $I_{D,pulse}$ | Pulsed Drain Current            | Pulse with $t_p$ limited by $T_{jmax}$            | 57      | A                |         |
| $P_D$         | Power Dissipation               | $T_c = 25^\circ\text{C}, T_j = 175^\circ\text{C}$ | 127     | W                | Fig. 16 |
| $T_j$         | Operating junction temperature  |                                                   | -55~175 | $^\circ\text{C}$ |         |
| $T_{stg}$     | Storage temperature             |                                                   | -55~175 | $^\circ\text{C}$ |         |



### Thermal Characteristics

| Symbol       | Parameter                                   | Value |      |      | Unit | Note    |
|--------------|---------------------------------------------|-------|------|------|------|---------|
|              |                                             | Min.  | Typ. | Max. |      |         |
| $R_{th(jc)}$ | Thermal resistance from Junction to Case    |       | 1.18 |      | K/W  | Fig. 15 |
| $R_{th(ja)}$ | Thermal resistance from Junction to Ambient |       | 40   |      | K/W  |         |

### Electrical Characteristics (T<sub>c</sub> = 25°C unless other wise specified)

#### Static Characteristics

| Symbol        | Parameter                        | Test conditions                                 | Value |      |      | Unit       | Note         |
|---------------|----------------------------------|-------------------------------------------------|-------|------|------|------------|--------------|
|               |                                  |                                                 | Min.  | Typ. | Max. |            |              |
| $V_{(BR)DSS}$ | Drain-Source Breakdown voltage   | $V_{GS} = 0V, I_D = 100\mu A$                   | 650   |      |      | V          |              |
| $V_{GS(th)}$  | Gate Threshold voltage           | $V_{GS} = V_{DS}, I_D = 5mA$                    |       | 2.3  |      | V          | Fig. 9       |
|               |                                  | $V_{GS} = V_{DS}, I_D = 5mA, T_j = 175^\circ C$ |       | 1.6  |      |            |              |
| $I_{GSS}$     | Gate-Source Leakage current      | $V_{GS} = 18V, V_{DS} = 0V$                     |       |      | 250  | nA         |              |
| $I_{DSS}$     | Zero Gate Voltage Drain Current  | $V_{DS} = 650V, V_{GS} = 0V, T_j = 25^\circ C$  |       | 1    | 50   | $\mu A$    |              |
| $R_{DS(on)}$  | Drain-Source On-state Resistance | $V_{GS} = 15V, I_D = 15A$                       |       | 90   |      | m $\Omega$ | Fig. 3, 4, 5 |
|               |                                  | $V_{GS} = 18V, I_D = 15A$                       |       | 75   | 105  |            |              |
|               |                                  | $V_{GS} = 15V, I_D = 15A, T_j = 175^\circ C$    |       | 112  |      |            |              |
|               |                                  | $V_{GS} = 18V, I_D = 15A, T_j = 175^\circ C$    |       | 105  |      |            |              |
| $g_{fs}$      | Transconductance                 | $V_{DS} = 15V, I_D = 15A$                       |       | 10   |      | S          | Fig. 6       |
|               |                                  | $V_{DS} = 15V, I_D = 15A, T_j = 175^\circ C$    |       | 9    |      |            |              |



### Gate Charge Characteristics

| Symbol   | Parameter             | Test conditions                                      | Value |      |      | Unit | Note    |
|----------|-----------------------|------------------------------------------------------|-------|------|------|------|---------|
|          |                       |                                                      | Min.  | Typ. | Max. |      |         |
| $Q_{GS}$ | Gate to Source Charge | $V_{DS} = 400V$<br>$I_D = 15A$<br>$V_{GS} = -4V/18V$ |       | 11.3 |      | nC   | Fig. 10 |
| $Q_{GD}$ | Gate to Drain Charge  |                                                      |       | 10.4 |      |      |         |
| $Q_G$    | Total Gate Charge     |                                                      |       | 32   |      |      |         |

### AC Characteristics

| Symbol       | Parameter                    | Test conditions                                                       | Value |      |      | Unit     | Note    |
|--------------|------------------------------|-----------------------------------------------------------------------|-------|------|------|----------|---------|
|              |                              |                                                                       | Min.  | Typ. | Max. |          |         |
| $C_{iss}$    | Input Capacitance            | $V_{GS} = 0V, V_{DS} = 600V$<br>$f = 1\text{ MHz}$<br>$V_{AC} = 25mV$ |       | 721  |      | pF       | Fig. 13 |
| $C_{oss}$    | Output Capacitance           |                                                                       |       | 60   |      | pF       |         |
| $C_{rss}$    | Reverse Transfer Capacitance |                                                                       |       | 4.9  |      | pF       |         |
| $R_{G(int)}$ | Internal Gate Resistance     | $f = 1\text{ MHz}, V_{AC} = 25mV$                                     |       | 3.8  |      | $\Omega$ |         |

### Reverse Diode Characteristics

| Symbol         | Parameter                        | Test conditions                                                      | Value |      |      | Unit | Note     |
|----------------|----------------------------------|----------------------------------------------------------------------|-------|------|------|------|----------|
|                |                                  |                                                                      | Min.  | Typ. | Max. |      |          |
| $V_{SD}$       | Diode Forward Voltage            | $V_{GS} = -4V, I_{SD} = 7.5A$                                        |       | 4.4  |      | V    | Fig. 7,8 |
|                |                                  | $V_{GS} = -4V, I_{SD} = 7.5A, T_J = 175^\circ C$                     |       | 3.8  |      |      |          |
| $I_S$          | Continuous Diode Forward Current | $V_{GS} = -4V, T_C = 25^\circ C$                                     |       | 26   |      | A    |          |
| $I_{S, pulse}$ | Diode pulse Current              | $V_{GS} = -4V, \text{pulse width } t_p \text{ limited by } T_{jmax}$ |       | 57   |      | A    |          |



## Typical Performance

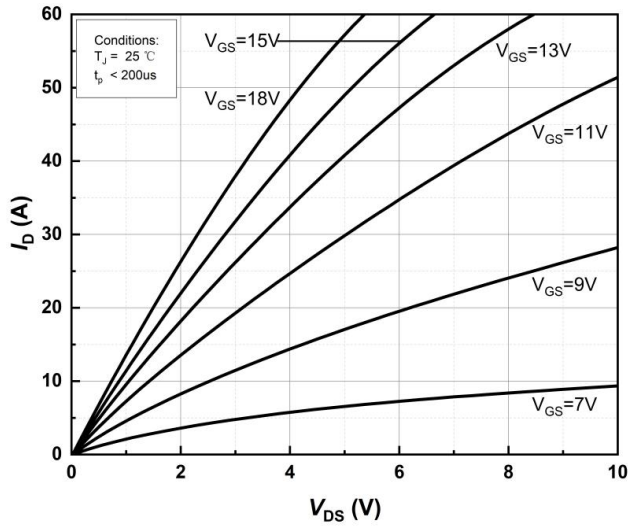


Figure 1. Output characteristics at  $T_j=25^\circ\text{C}$

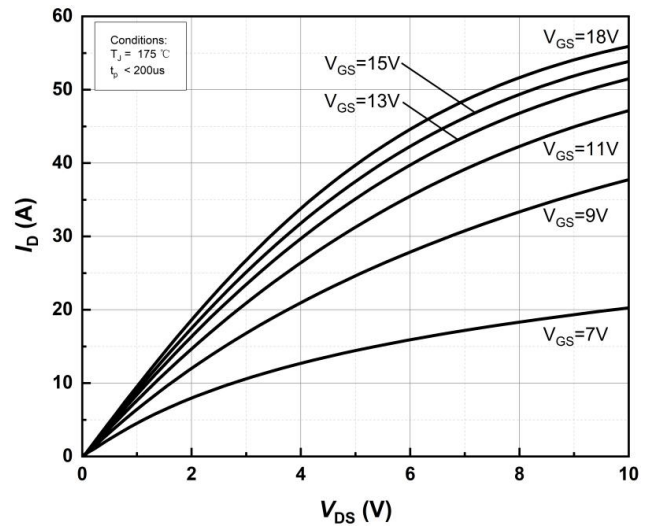


Figure 2. Output characteristics at  $T_j=175^\circ\text{C}$

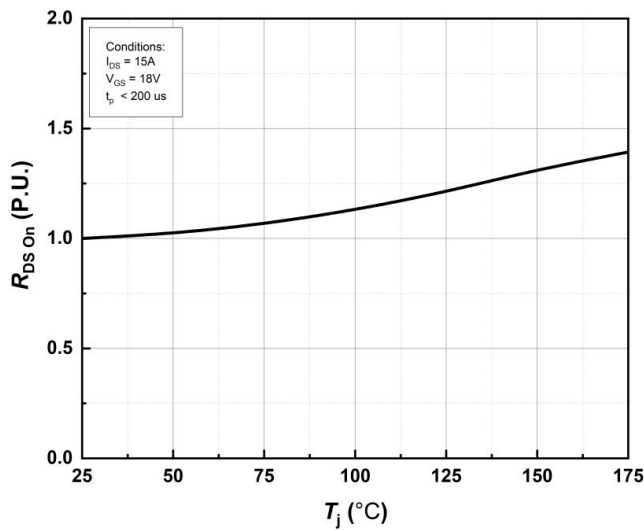


Figure 3. Normalized On-Resistance vs. Temperature

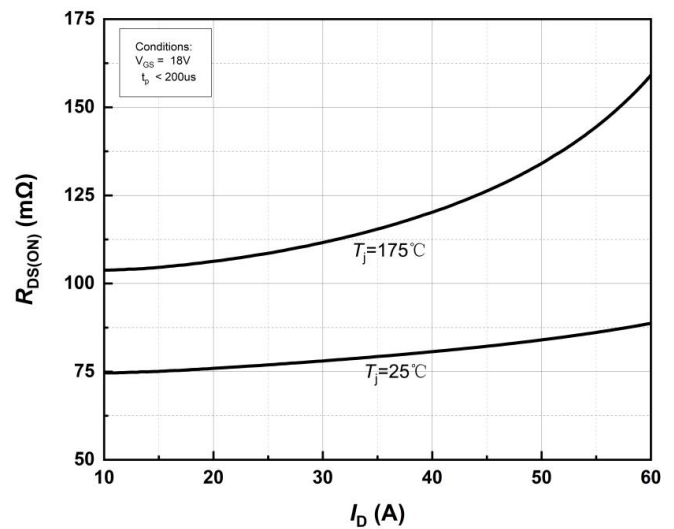


Figure 4. On-Resistance vs. Drain current for Various Temperature

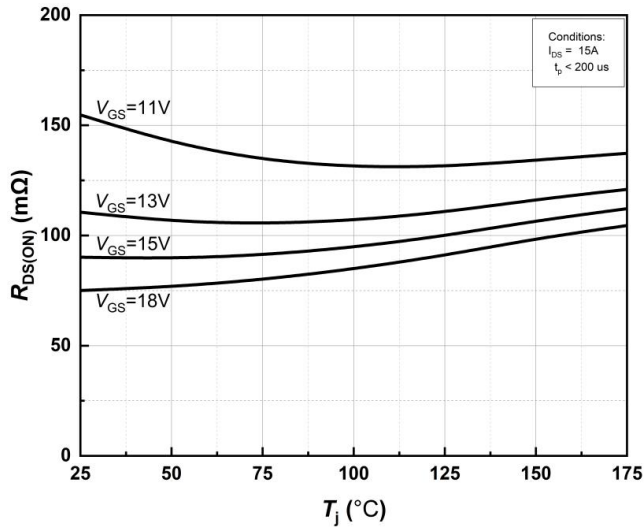


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

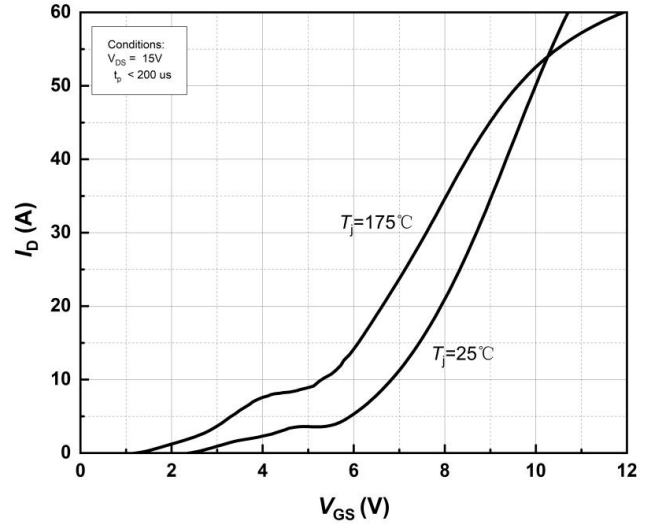


Figure 6. Transfer Characteristics for Various Junction Temperatures

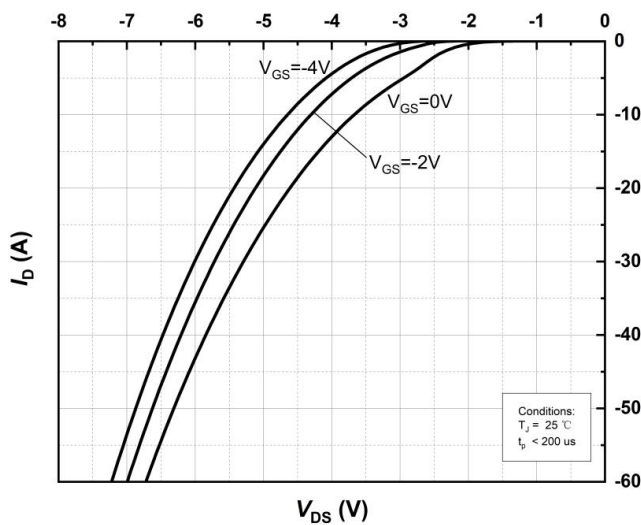


Figure 7. Body Diode Characteristics at  $T_j=25^{\circ}C$

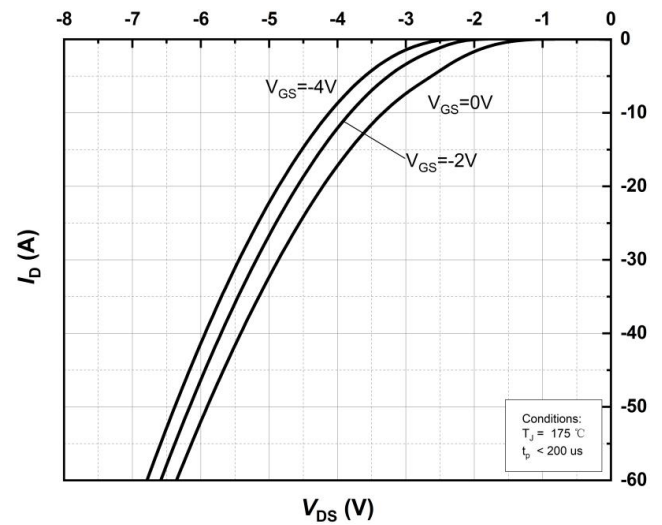


Figure 8. Body Diode Characteristics at  $T_j=175^{\circ}C$

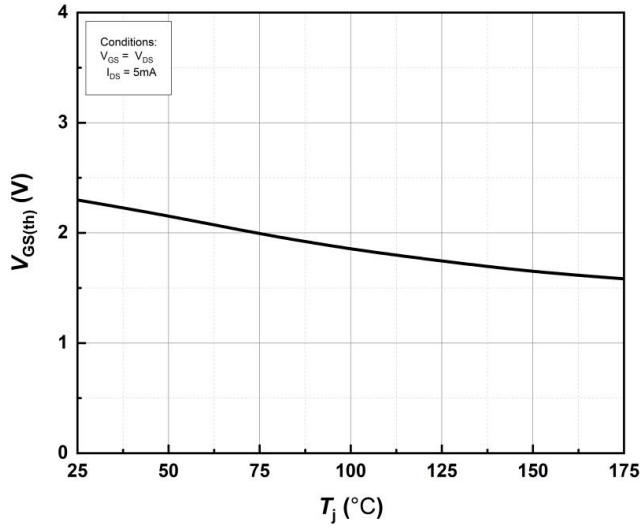


Figure 9. Threshold Voltage vs. Temperature

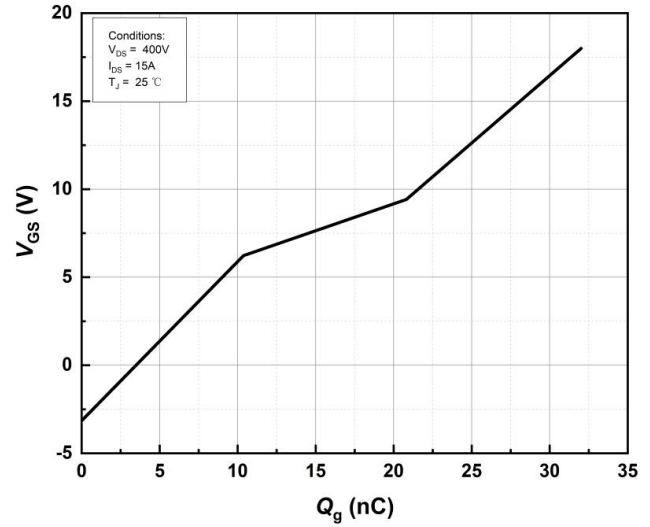


Figure 10 Gate Charge Characteristics

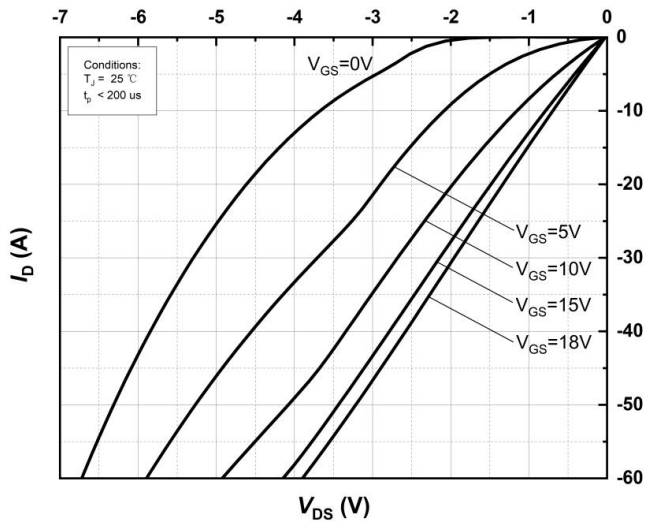


Figure 11. 3rd Quadrant Characteristic at  $T_J=25^\circ\text{C}$

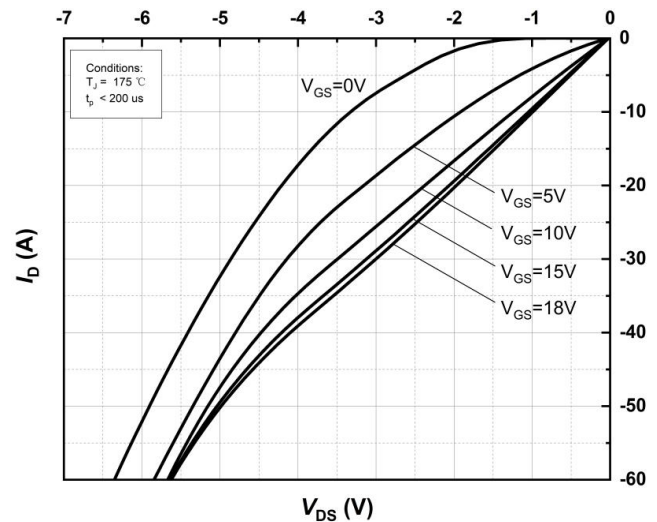


Figure 12. 3rd Quadrant Characteristic at  $T_J=175^\circ\text{C}$

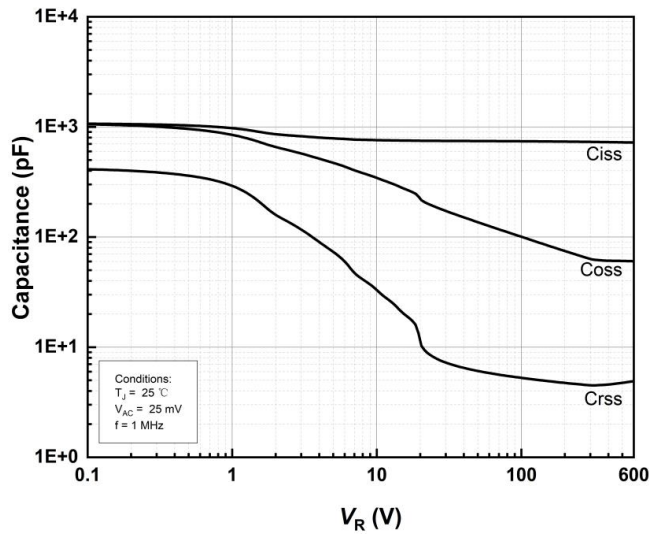


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 600V)

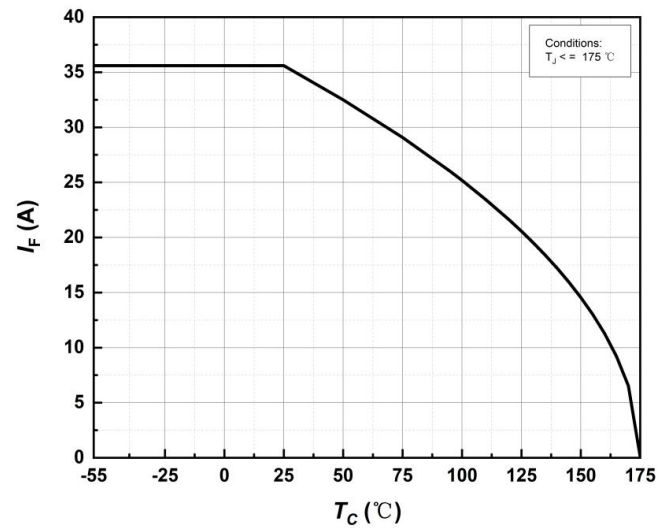


Figure 14. Continuous Drain Current Derating vs Case Temperature

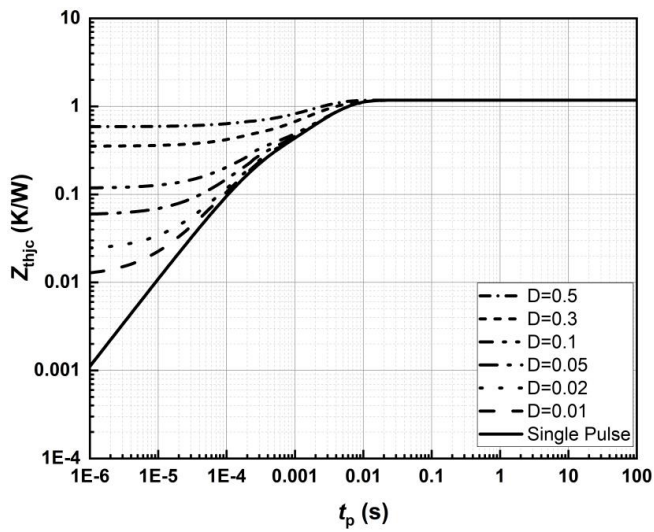


Figure 15. Transient Thermal Impedance (Junction – Case)

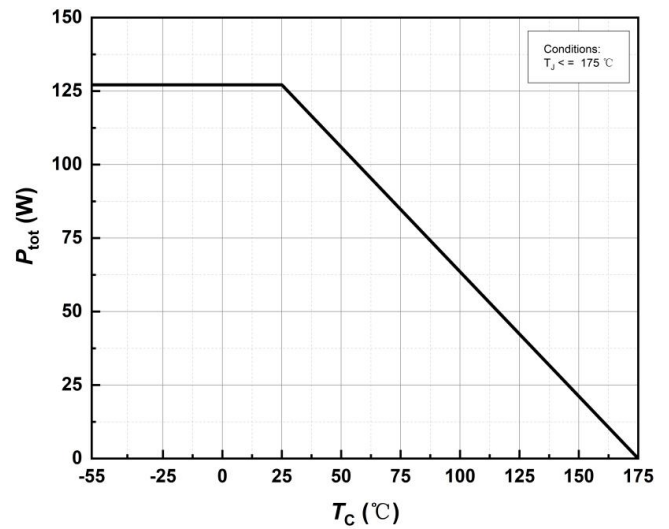


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

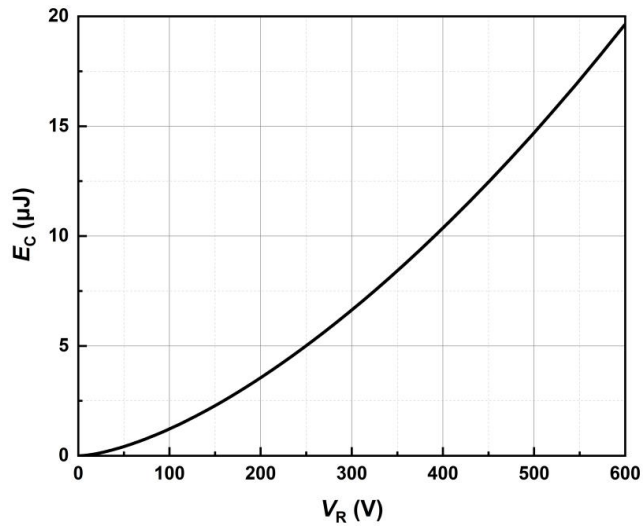


Figure 17. Output Capacitor Stored Energy

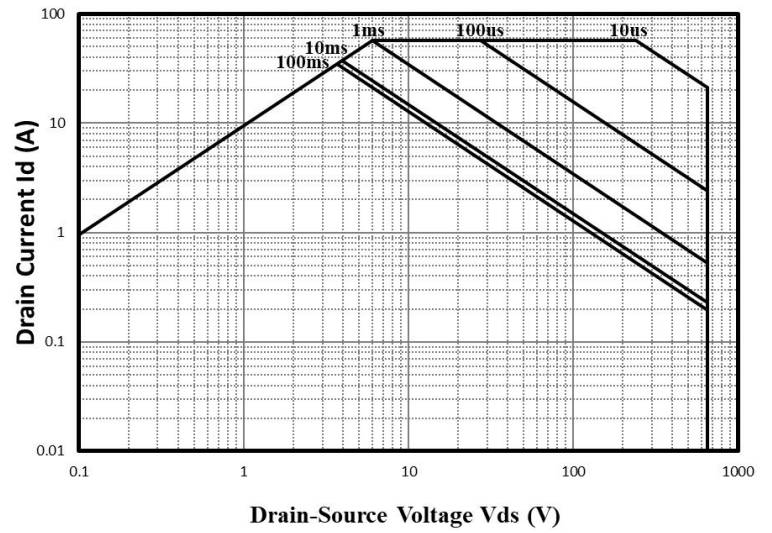
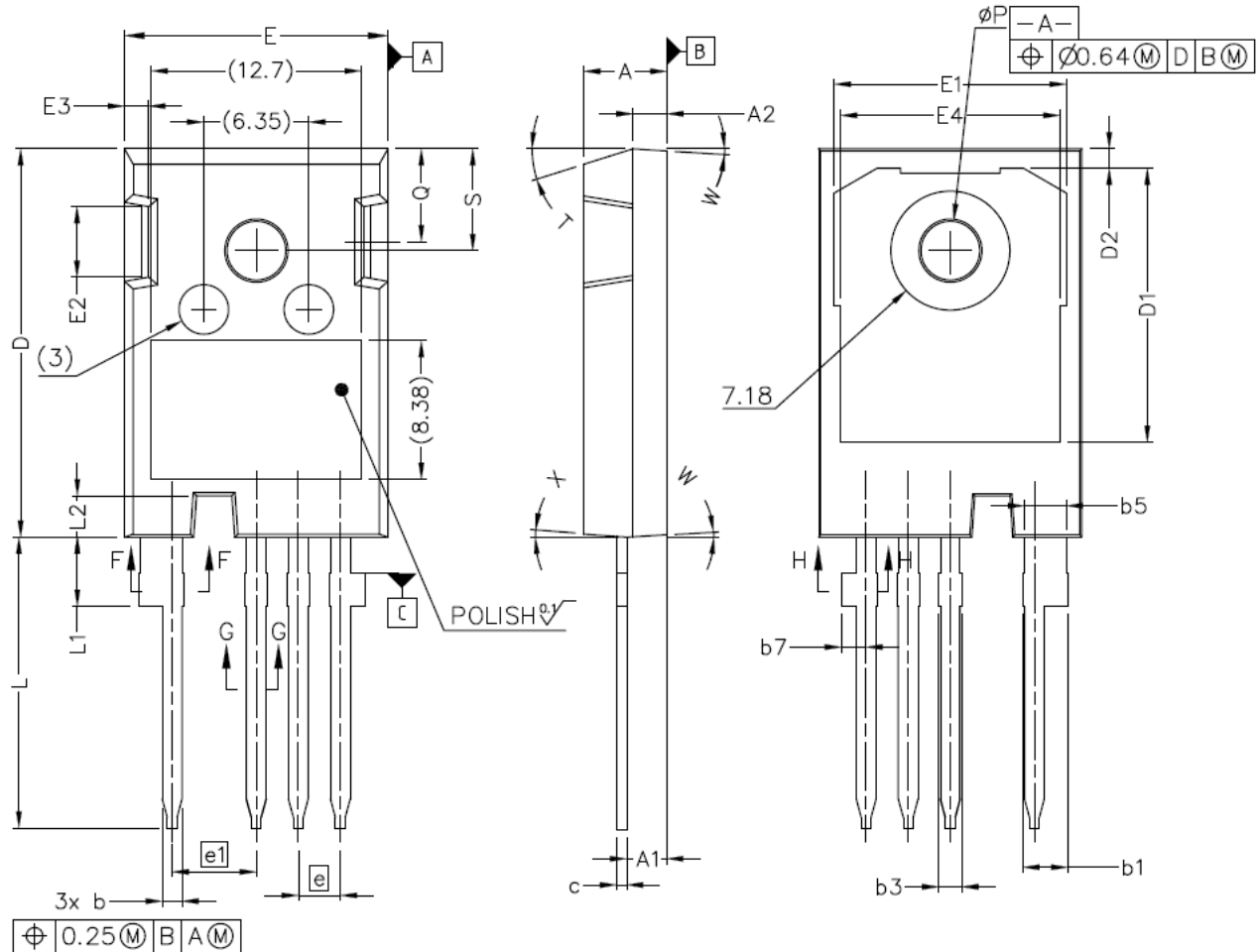


Figure 18. Safe Operating Area



## Package Dimensions

Package TO-247H-4L



SECTION "F-F", "G-G" AND "H-H"  
SCALE: NONE

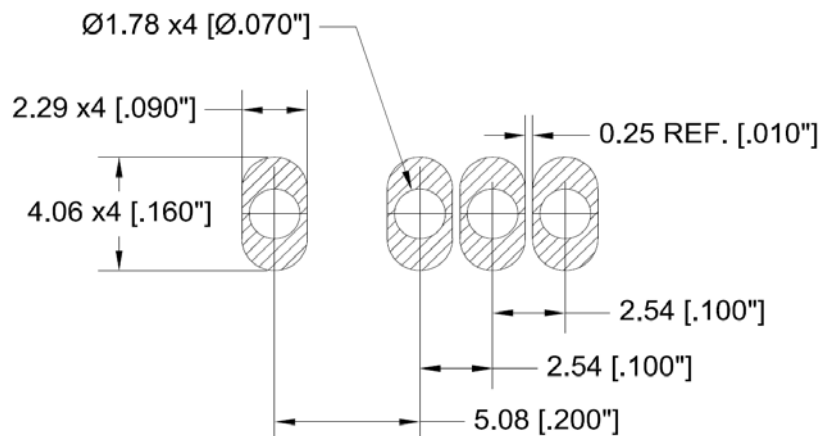


NOTE ;

1. ALL METAL SURFACES: TIN PLATED, EXCEPT AREA OF CUT
2. DIMENSIONING & TOLERANCEING CONFIRM TO  
ASME Y14.5M-1994.
3. ALL DIMENSIONS ARE IN MILLIMETERS.  
ANGLES ARE IN DEGREES.
4. 'N' IS THE NUMBER OF TERMINAL POSITIONS

| SYM | MILLIMETERS |       |
|-----|-------------|-------|
|     | MIN         | MAX   |
| A   | 4.83        | 5.21  |
| A1  | 2.29        | 2.54  |
| A2  | 1.91        | 2.16  |
| b`  | 1.07        | 1.28  |
| b   | 1.07        | 1.33  |
| b1  | 2.39        | 2.94  |
| b2  | 2.39        | 2.84  |
| b3  | 1.07        | 1.60  |
| b4  | 1.07        | 1.50  |
| b5  | 2.39        | 2.69  |
| b6  | 2.39        | 2.64  |
| b7  | 1.30        | 1.70  |
| c`  | 0.55        | 0.65  |
| c   | 0.55        | 0.68  |
| D   | 23.30       | 23.60 |
| D1  | 16.25       | 17.65 |
| D2  | 0.95        | 1.25  |
| E   | 15.75       | 16.13 |

| SYM | MILLIMETERS |       |
|-----|-------------|-------|
|     | MIN         | MAX   |
| E1  | 13.10       | 14.15 |
| E2  | 3.68        | 5.10  |
| E3  | 1.00        | 1.90  |
| E4  | 12.38       | 13.43 |
| e   | 2.54 BSC    |       |
| e1  | 5.08 BSC    |       |
| N*  | 4           |       |
| L   | 17.31       | 17.82 |
| L1  | 3.97        | 4.37  |
| L2  | 2.35        | 2.65  |
| Ø P | 3.51        | 3.65  |
| Q   | 5.49        | 6.00  |
| S   | 6.04        | 6.30  |
| T   | 17.5° REF.  |       |
| W   | 3.5° REF.   |       |
| X   | 4° REF.     |       |





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