

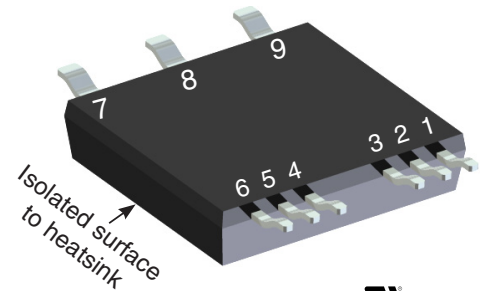
SiC Power MOSFET


$$I_{D25} = 25.5 \text{ A}$$

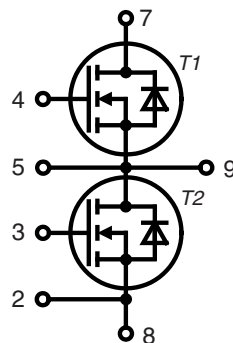
$$V_{DSS} = 1200 \text{ V}$$

$$R_{DS(on) \text{ max}} = 98 \text{ m}\Omega$$

Part number
 MCB20P1200LB



 E72873



Features / Advantages:

- High speed switching with low capacitances
- High blocking voltage with low $R_{DS(on)}$
- Easy to parallel and simple to drive
- Resistant to latch-up
- Real Kelvin source connection

Applications:

- Solar inverters
- High voltage DC/DC converters
- Motor drives
- Switch mode power supplies
- UPS
- Battery chargers
- Induction heating

Package: SMPD

- DCB isolated backside
- Isolation Voltage 2500 V
- Epoxy meets UL 94V-0
- RoHS compliant
- Advanced power cycling

Disclaimer Notice

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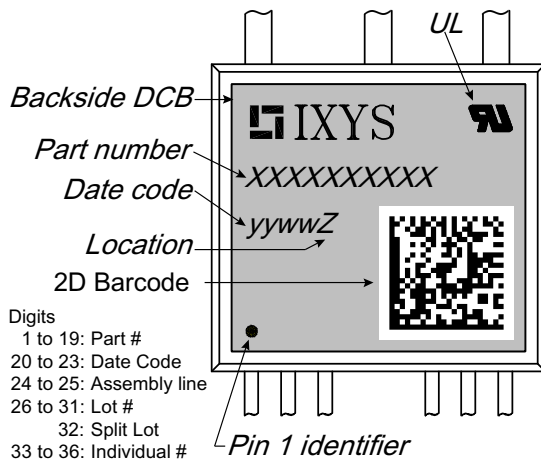
| MOSFET | | | | Ratings | | | |
|----------------|---|--|------|---------|------|--|---------|
| Symbol | Definitions | Conditions | min. | typ. | max. | | |
| V_{DSS} | drain source breakdown voltage | $V_{GS} = 0 V, I_D = 100 \mu A$ | 1200 | | | | V |
| V_{GSM} | max transient gate source voltage | | -10 | | +25 | | V |
| V_{GS} | continous gate source voltage | recommended operational value | -5 | | +20 | | V |
| I_{D25} | drain current | $V_{GS} = 20 V$ | | | 25.5 | | A |
| I_{D80} | | | | | 20.5 | | A |
| I_{D100} | | | | | 18 | | A |
| R_{DSon} | static drain source on resistance | $I_D = 50 A; V_{GS} = 20 V$ | | 80 | 98 | | mΩ |
| | | | | 155 | | | mΩ |
| $V_{GS(th)}$ | gate threshold voltage | $I_D = 5 mA; V_{GS} = V_{DS}$ | 2.0 | 2.6 | 4.0 | | V |
| | | | | 2.1 | | | V |
| I_{DSS} | drain source leakage current | $V_{DS} = 1200 V; V_{GS} = 0 V$ | | 2 | 100 | | μA |
| I_{GSS} | gate source leakage current | $V_{DS} = 0 V; V_{GS} = 20 V$ | | | 250 | | nA |
| R_G | internal gate resistance | $f = 1 MHz, V_{AC} = 25 mV, ESR \text{ of } C_{ISS}$ | | 4.6 | | | Ω |
| C_{ISS} | input capacitance | | | 950 | | | pF |
| C_{OSS} | output capacitance | $V_{DS} = 1000 V; V_{GS} = 0 V; f = 1 MHz$ | | 80 | | | pF |
| C_{RSS} | reverse transfer (Miller) capacitance | $T_{VJ} = 25^\circ C$ | | 7.6 | | | pF |
| Q_g | total gate charge | | | 62 | | | nC |
| Q_{gs} | gate source charge | $V_{DS} = 800 V; I_D = 40 A; V_{GS} = -5/20 V$ | | 23 | | | nC |
| Q_{gd} | gate drain (Miller) charge | $T_{VJ} = 25^\circ C$ | | 37 | | | nC |
| $t_{d(on)}$ | turn-on delay time | | | 19 | | | ns |
| t_r | current rise time | | | 7 | | | ns |
| $t_{d(off)}$ | turn-off delay time | Inductive switching | | 66 | | | ns |
| t_f | current fall time | $V_{DS} = 800 V; I_D = 20 A$ | | 23 | | | ns |
| E_{on} | turn-on energy per pulse | $V_{GS} = -5 / 20 V; R_G = 22 \Omega$ (external) | | 0.41 | | | mJ |
| E_{off} | turn-off energy per pulse | Freewheeling diode is Mosfet's body diode | | 0.21 | | | mJ |
| $E_{rec(off)}$ | reverse recovery losses at turn-off | | | 0.07 | | | mJ |
| $t_{d(on)}$ | turn-on delay time | | | 18 | | | ns |
| t_r | current rise time | | | 7 | | | ns |
| $t_{d(off)}$ | turn-off delay time | Inductive switching | | 75 | | | ns |
| t_f | current fall time | $V_{DS} = 800 V; I_D = 20 A$ | | 21 | | | ns |
| E_{on} | turn-on energy per pulse | $V_{GS} = -5 / 20 V; R_G = 22 \Omega$ (external) | | 0.49 | | | mJ |
| E_{off} | turn-off energy per pulse | Freewheeling diode is Mosfet's body diode | | 0.20 | | | mJ |
| $E_{rec(off)}$ | reverse recovery losses at turn-off | | | 0.10 | | | mJ |
| R_{thJC} | thermal resistance junction to case | | | | 1.0 | | K/W |
| R_{thJH} | thermal resistance junction to heatsink | with heatsink compound; IXYS test setup | | 1.5 | | | K/W |

| Source-Drain Diode | | | | Ratings | | | |
|--------------------|---|--|------|---------|------|--|------------|
| Symbol | Definitions | Conditions | min. | typ. | max. | | |
| V_{SD} | forward voltage drop | $I_F = 10 A; V_{GS} = -5 V$ | | 3.3 | | | V |
| | | | | 3.1 | | | V |
| t_{rr} | reverse recovery time | $V_{GS} = -5 V; I_F = 20 A; V_R = 800 V$ | | 15 | | | ns |
| Q_{RM} | reverse recovery charge (intrinsic diode) | Mosfet gate drive: | | 0.20 | | | μC |
| I_{RM} | max. reverse recovery current | $V_{GS} = -5 / 20 V; R_G = 22 \Omega$ | | 23 | | | A |
| di_F/dt | current slew rate | | | 3650 | | | A/ μs |
| t_{rr} | reverse recovery time | $V_{GS} = -5 V; I_F = 20 A; V_R = 800 V$ | | 19 | | | ns |
| Q_{RM} | reverse recovery charge (intrinsic diode) | Mosfet gate drive: | | 0.42 | | | μC |
| I_{RM} | max. reverse recovery current | $V_{GS} = -5 / 20 V; R_G = 22 \Omega$ | | 35 | | | A |
| di_F/dt | current slew rate | | | 4120 | | | A/ μs |

Note:

 When using SiC Body Diode the maximum recommended $V_{GS} = -5V$

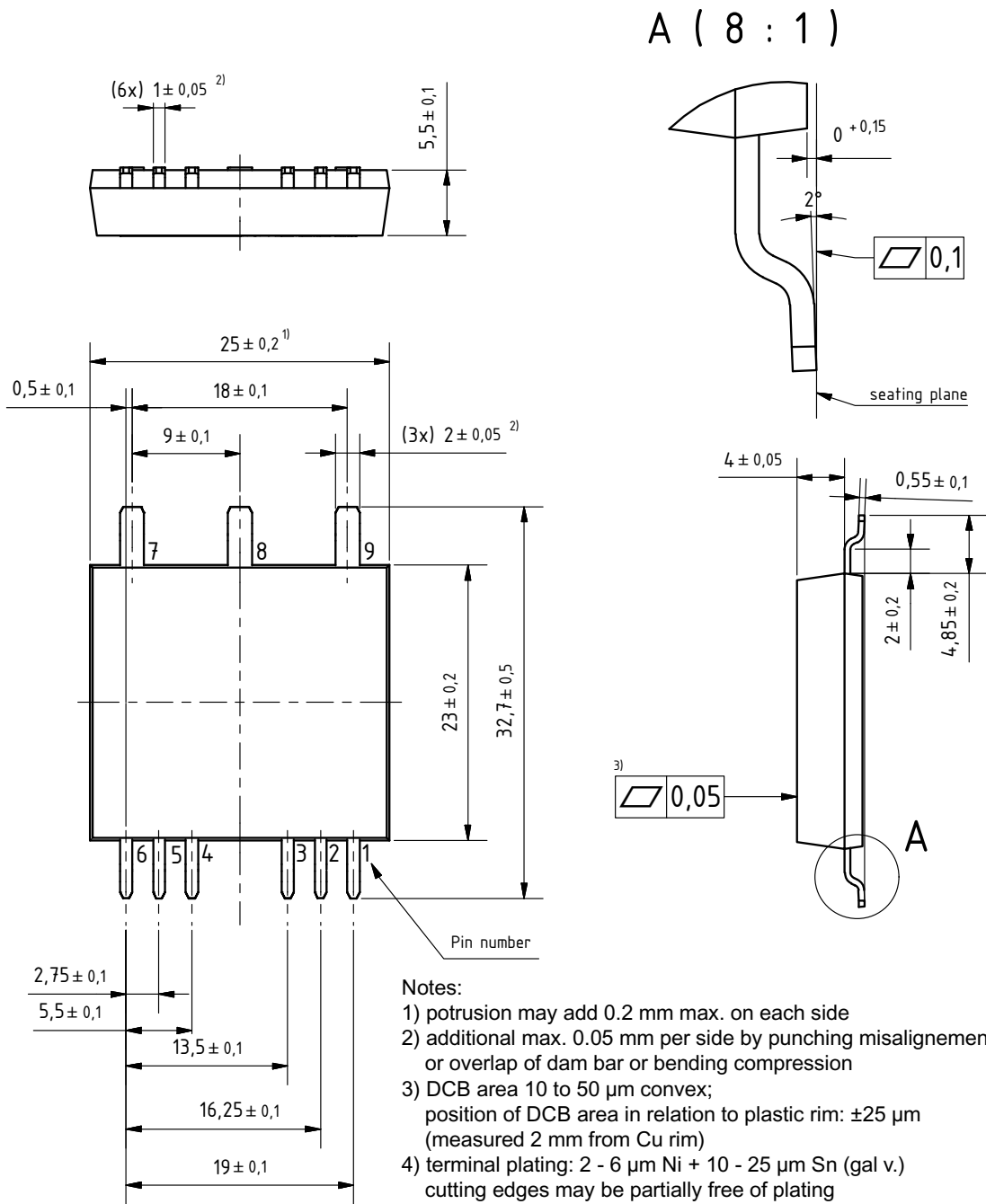
| Package SMPD | | | Ratings | | | |
|----------------|--------------------------------|------------------------------------|---------|------|--------------|--------|
| Symbol | Definitions | Conditions | min. | typ. | max. | |
| I_{RMS} | RMS current | wide terminal standard terminal | | | 100 60 | A A |
| T_{stg} | storage temperature | | -55 | | 150 | °C |
| T_{op} | operation temperature | | -55 | | 150 | °C |
| T_{vj} | virtual junction temperature | | -55 | | 175 | °C |
| Weight | | | | 8 | | g |
| F_c | mounting force with clip | | 40 | | 130 | N |
| $d_{Spp/App}$ | creepage distance on surface / | terminal to terminal | 1.6 | | | mm |
| $d_{Spb/Appb}$ | striking distance through air | terminal to backside | 4.0 | | | mm |
| V_{ISOL} | isolation voltage | t = 1 second t = 1 minute | | | 3000 2500 | V V |
| | | 50/60 Hz; RMS; $I_{ISOL} < 1$ mA | | | | |


Part number

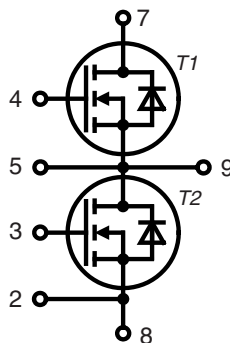
M = Mosfet
 C = SiC MOSFET
 B = Generation 2
 20 = Current Rating [A]
 P = Phase leg
 1200 = Reverse Voltage [V]
 LB = SMPD-B

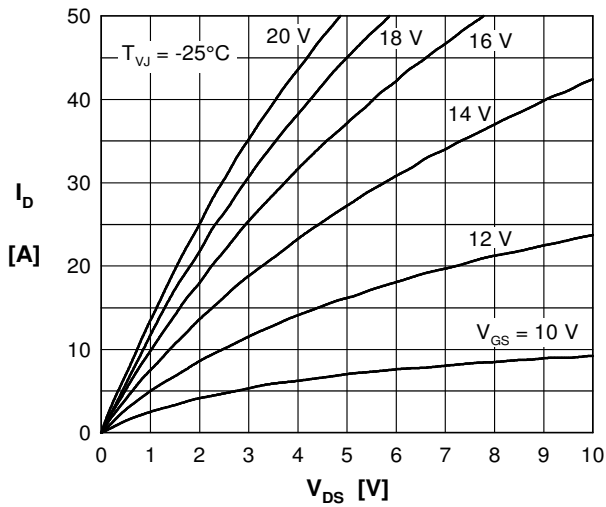
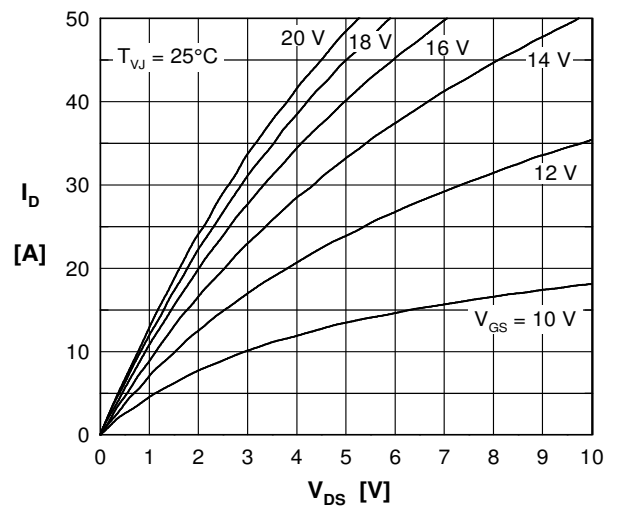
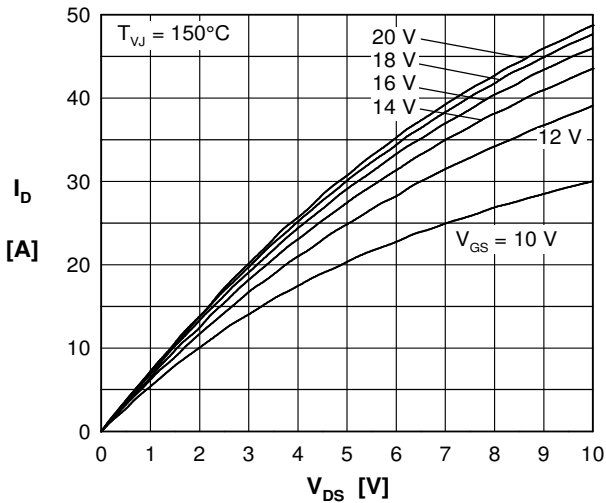
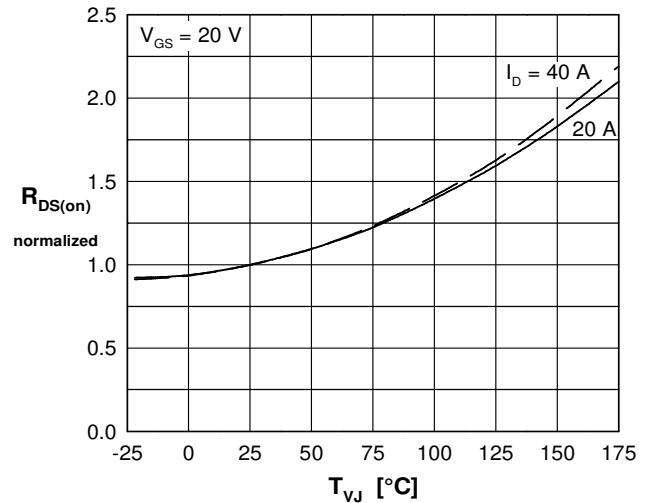
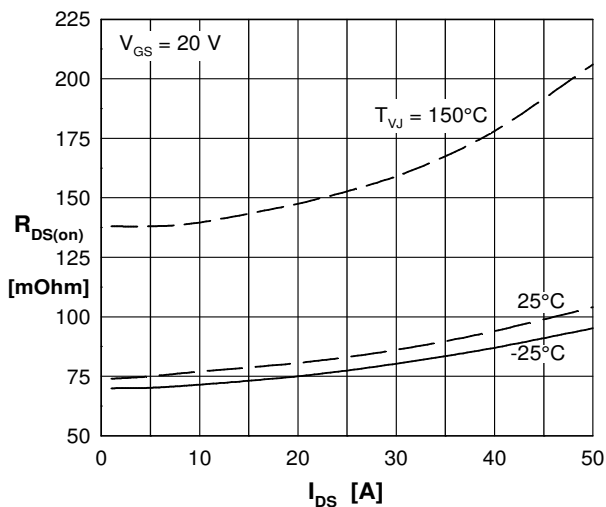
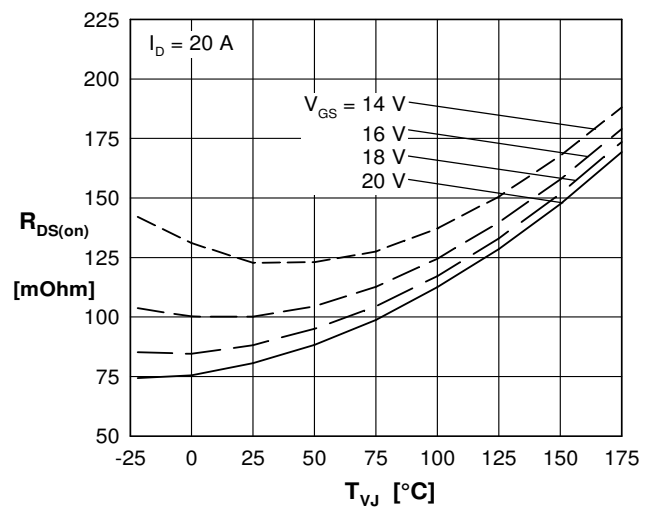
Digits
 1 to 19: Part #
 20 to 23: Date Code
 24 to 25: Assembly line
 26 to 31: Lot #
 32: Split Lot
 33 to 36: Individual #

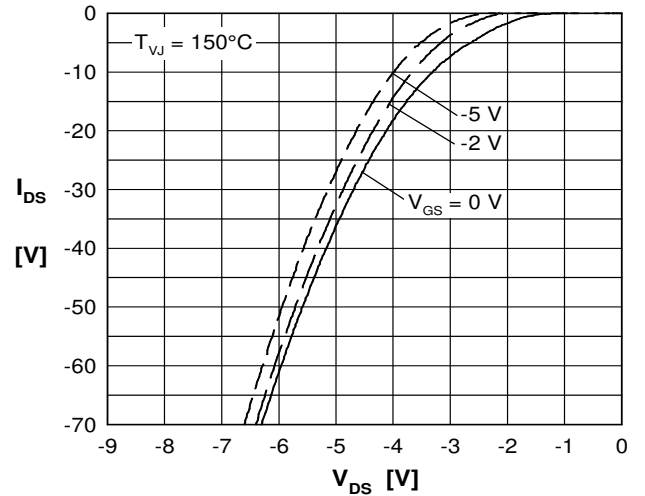
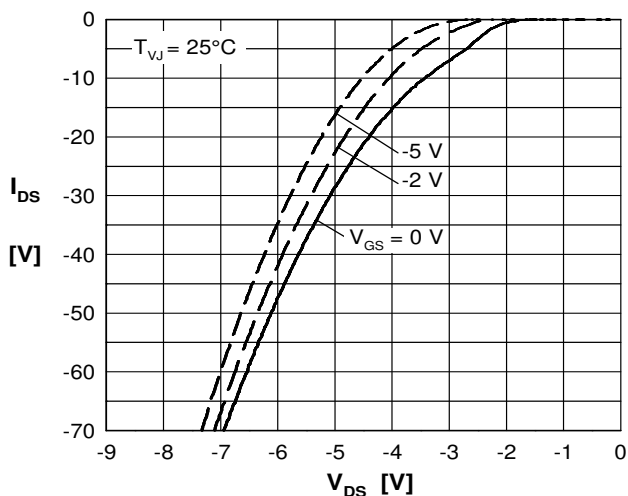
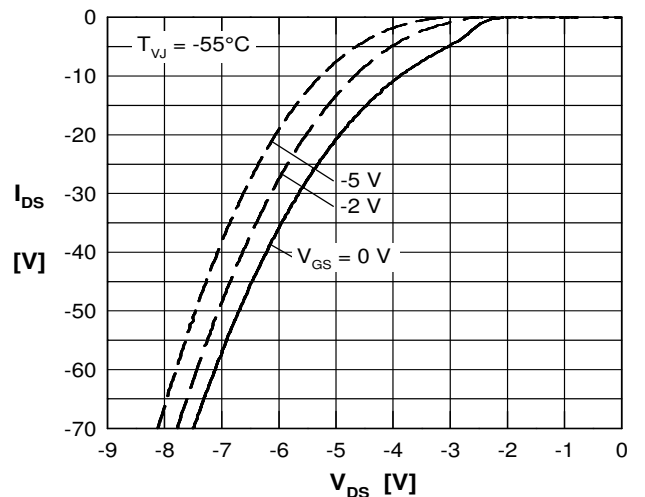
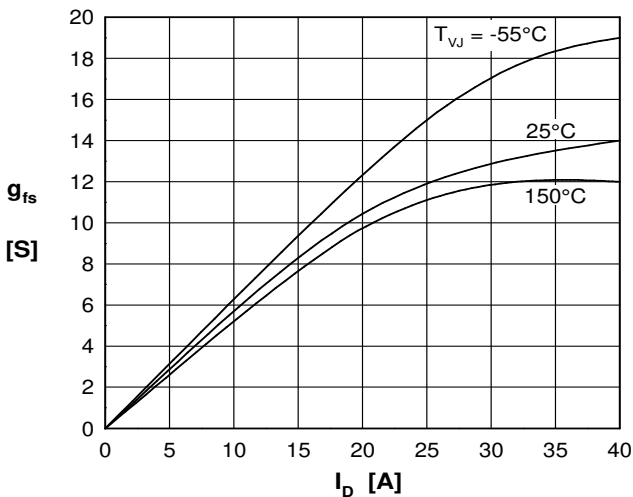
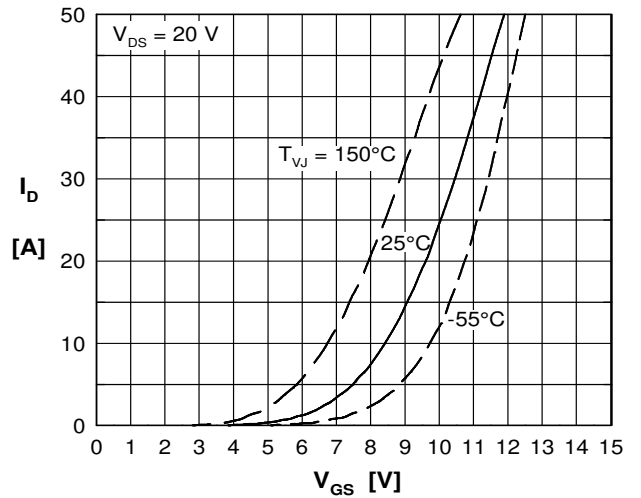
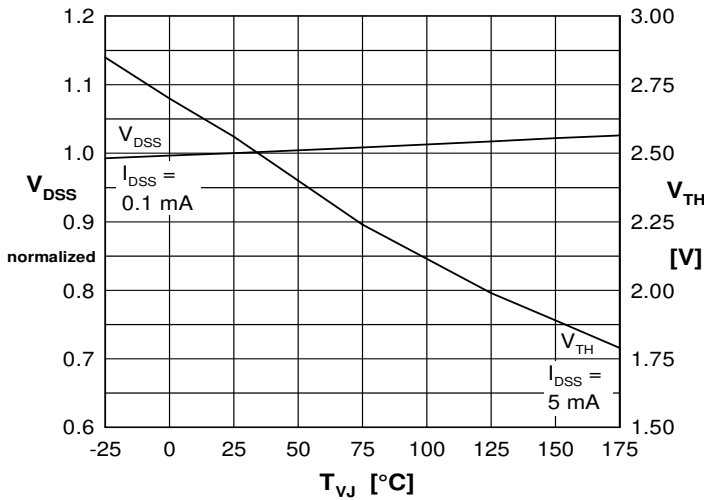
| Ordering | Part Name | Marking on Product | Delivering Mode | Base Qty | Ordering Code |
|-------------|------------------|--------------------|-----------------|----------|------------------|
| Standard | MCB20P1200LB-TUB | MCB20P1200LB | Tube | 20 | MCB20P1200LB-TUB |
| Alternative | MCB20P1200LB-TRR | MCB20P1200LB | Tape&Reel | 200 | MCB20P1200LB-TRR |

Outlines SMPD-B


Dimensions in mm
 (1 mm = 0.0394")



Curves

 Fig. 1 Typical output characteristics (-25°C)

 Fig. 2 Typical output characteristics (25°C)

 Fig. 3 Typical output characteristics (150°C)

 Fig. 4 $R_{DS(on)}$ normalized vs. junction temperature T_{VJ}

 Fig. 5 $R_{DS(on)}$ versus drain current

 Fig. 6 $R_{DS(on)}$ versus junction temperature T_{VJ}

Curves


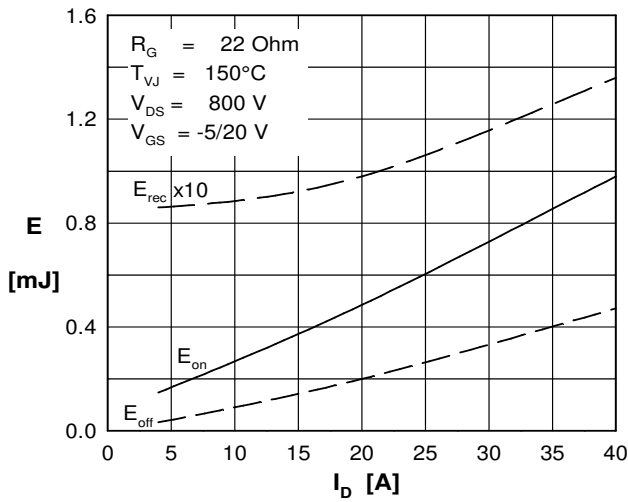
Curves


Fig. 13 Typical switching energy versus drain current

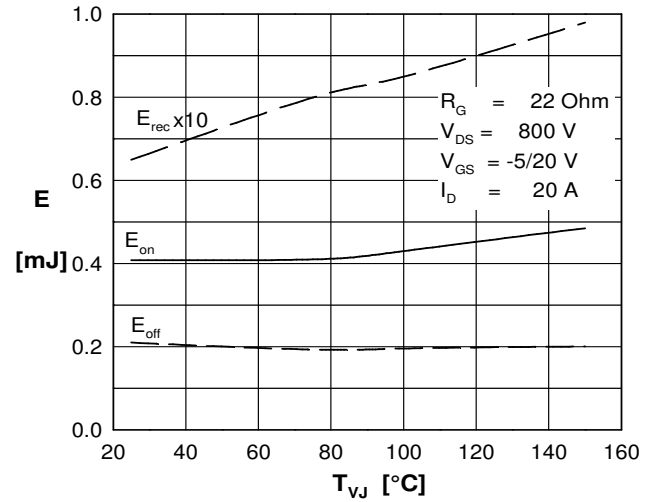


Fig. 14 Typical switching energy versus temperature

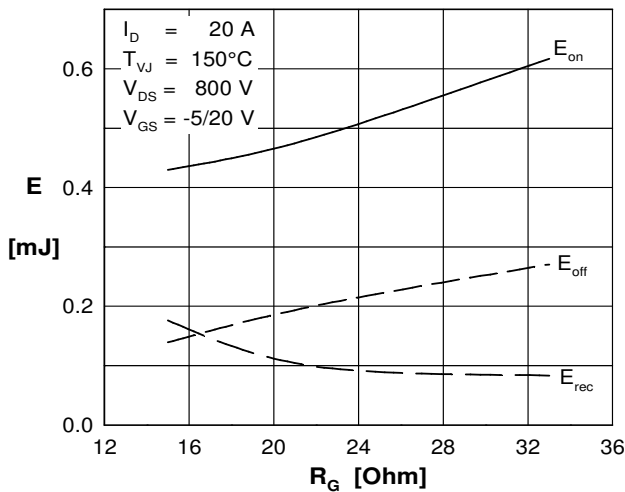


Fig. 15 Typical switching energy versus external gate resistor

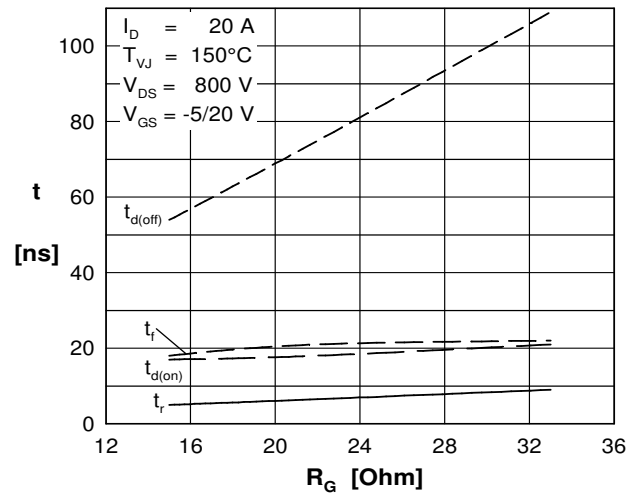


Fig. 16 Typical switching time versus external gate resistor

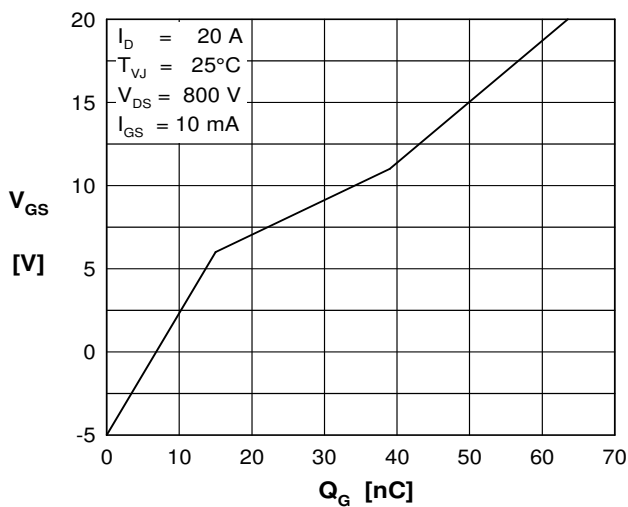


Fig. 17 Typical turn on gate charge, trendline

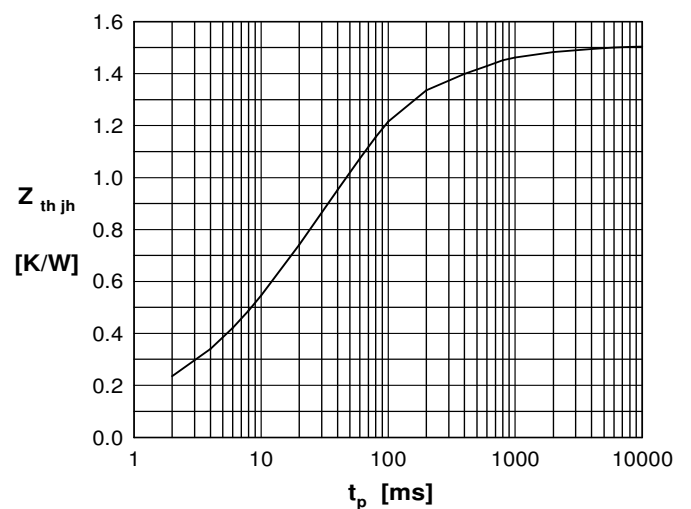


Fig. 18 Typical transient thermal impedance