

IGBT (NPT) Module

$$V_{CES} = 1200V$$

$$I_{C25} = 135A$$

$$V_{CE(sat)} = 2.2V$$


Buck Chopper + free wheeling Diode

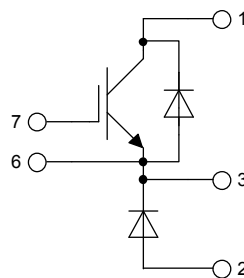
Part number

MDI100-12A3



Backside: isolated

 E72873



Features / Advantages:

- NPT IGBT technology
- low saturation voltage
- low switching losses
- switching frequency up to 30 kHz
- square RBSOA, no latch up
- high short circuit capability
- positive temperature coefficient for easy parallelling
- MOS input, voltage controlled
- ultra fast free wheeling diodes

Applications:

- AC motor drives
- Solar inverter
- Medical equipment
- Uninterruptible power supply
- Air-conditioning systems
- Welding equipment
- Switched-mode and resonant-mode power supplies
- Inductive heating, cookers
- Pumps, Fans

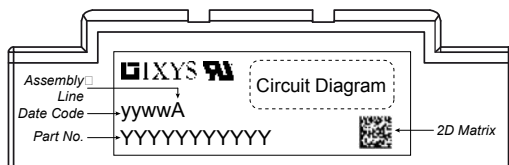
Package: Y4

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

| Free Wheeling Diode FWD | | | | Ratings | | |
|-------------------------|--|--|------|---------|------|------|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit |
| V_{RSM} | max. non-repetitive reverse blocking voltage | | | | 1200 | V |
| V_{RRM} | max. repetitive reverse blocking voltage | | | | 1200 | V |
| I_R | reverse current, drain current | $V_R = 1200\text{ V}$ | | | 1 | mA |
| | | $V_R = 1200\text{ V}$ | | | 3 | mA |
| V_F | forward voltage drop | $I_F = 75\text{ A}$ | | | 2.50 | V |
| | | $I_F = 150\text{ A}$ | | | 2.90 | V |
| | | $I_F = 75\text{ A}$ | | | 1.80 | V |
| | | $I_F = 150\text{ A}$ | | | 2.10 | V |
| I_{FAV} | average forward current | $T_C = 80^\circ\text{C}$ | | | 75 | A |
| | | DC current $d = 1$ | | | | |
| V_{FO} | threshold voltage | } for power loss calculation only | | | 1.30 | V |
| r_F | slope resistance | | | | 7.5 | mΩ |
| R_{thJC} | thermal resistance junction to case | | | | 0.45 | K/W |
| R_{thCH} | thermal resistance case to heatsink | | | 0.45 | | K/W |
| P_{tot} | total power dissipation | | | | 280 | W |
| I_{FSM} | max. forward surge current | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}; V_R = 0\text{ V}$ | | | 700 | A |
| C_J | junction capacitance | $V_R = 600\text{ V}$ $f = 1\text{ MHz}$ | | | 48 | pF |

| Buck IGBT | | | | Ratings | | | |
|----------------------|--------------------------------------|--|-------------|----------------|-------------|-------------|--|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit | |
| V_{CES} | collector emitter voltage | $T_{VJ} = 25^{\circ}C$ | | | 1200 | V | |
| V_{GES} | max. DC gate voltage | | | | ± 20 | V | |
| V_{GEM} | max. transient gate emitter voltage | | | | ± 30 | V | |
| I_{C25} | collector current | $T_C = 25^{\circ}C$ | | | 135 | A | |
| I_{C80} | | $T_C = 80^{\circ}C$ | | | 90 | A | |
| P_{tot} | total power dissipation | $T_C = 25^{\circ}C$ | | | 560 | W | |
| $V_{CE(sat)}$ | collector emitter saturation voltage | $I_C = 75A; V_{GE} = 15V$ | | | 2.2 | V | |
| | | | | | 2.7 | V | |
| $V_{GE(th)}$ | gate emitter threshold voltage | $I_C = 3mA; V_{GE} = V_{CE}$ | 4.5 | 5.5 | 6.5 | V | |
| I_{CES} | collector emitter leakage current | $V_{CE} = V_{CES}; V_{GE} = 0V$ | | | 5 | mA | |
| | | | | | 7.5 | mA | |
| I_{GES} | gate emitter leakage current | $V_{GE} = \pm 20V$ | | | 300 | nA | |
| $Q_{G(on)}$ | total gate charge | $V_{CE} = 600V; V_{GE} = 15V; I_C = 75A$ | | 350 | | nC | |
| $t_{d(on)}$ | turn-on delay time | inductive load $V_{CE} = 600V; I_C = 75A$ $V_{GE} = \pm 15V; R_G = 15\Omega$ | | 100 | | ns | |
| t_r | current rise time | | | 50 | | ns | |
| $t_{d(off)}$ | turn-off delay time | | | 650 | | ns | |
| t_f | current fall time | | | 50 | | ns | |
| E_{on} | turn-on energy per pulse | | | 12.1 | | mJ | |
| E_{off} | turn-off energy per pulse | | | 10.5 | | mJ | |
| RBSOA | reverse bias safe operating area | $V_{GE} = \pm 15V; R_G = 15\Omega$ | | | | | |
| I_{CM} | | $V_{CEmax} = 1200V$ | | | 150 | A | |
| SCSOA | short circuit safe operating area | $V_{CEmax} = 1200V$ | | | | | |
| t_{sc} | short circuit duration | $V_{CE} = 1200V; V_{GE} = \pm 15V$ | | | 10 | μs | |
| I_{sc} | short circuit current | $R_G = 15\Omega; \text{non-repetitive}$ | | 270 | | A | |
| R_{thJC} | thermal resistance junction to case | | | | 0.22 | K/W | |
| R_{thCH} | thermal resistance case to heatsink | | | | 0.22 | K/W | |
| Buck Diode BD | | | | | | | |
| V_{RRM} | max. repetitive reverse voltage | $T_{VJ} = 25^{\circ}C$ | | | 1200 | V | |
| I_{F25} | forward current | $T_C = 25^{\circ}C$ | | | 150 | A | |
| I_{F80} | | $T_C = 80^{\circ}C$ | | | 95 | A | |
| V_F | forward voltage | $I_F = 75A$ | | | 2.50 | V | |
| | | | | | 1.70 | V | |
| I_R | reverse current | $V_R = V_{RRM}$ | | | 1 | mA | |
| | | | | | 1.5 | mA | |
| Q_{rr} | reverse recovery charge | $V_R = 600V$ $-di_F/dt = 600A/\mu s$ $I_F = 75A; V_{GE} = 0V$ | | 7 | | μC | |
| I_{RM} | max. reverse recovery current | | | 62 | | A | |
| t_{rr} | reverse recovery time | | | 200 | | ns | |
| E_{rec} | reverse recovery energy | | | 1.2 | | mJ | |
| R_{thJC} | thermal resistance junction to case | | | | 0.45 | K/W | |
| R_{thCH} | thermal resistance case to heatsink | | | | 0.45 | K/W | |

| Package Y4 | | | | Ratings | | |
|---------------|--|----------------------|-------------------------------------|---------|------|------|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit |
| I_{RMS} | RMS current | per terminal | | | 300 | A |
| T_{VJ} | virtual junction temperature | | -40 | | 150 | °C |
| T_{op} | operation temperature | | -40 | | 125 | °C |
| T_{stg} | storage temperature | | -40 | | 125 | °C |
| Weight | | | | | 108 | g |
| M_D | mounting torque | | 2.25 | | 2.75 | Nm |
| M_T | terminal torque | | 4.5 | | 5.5 | Nm |
| $d_{Spp/App}$ | creepage distance on surface striking distance through air | terminal to terminal | 14.0 | 10.0 | | mm |
| $d_{Spb/Apb}$ | | terminal to backside | 16.0 | 16.0 | | mm |
| V_{ISOL} | isolation voltage | t = 1 second | | | 3600 | V |
| | | t = 1 minute | 50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA | | 3000 | V |



| Ordering | Part Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-------------|--------------------|---------------|----------|----------|
| Standard | MDI100-12A3 | MDI100-12A3 | Box | 6 | 466824 |

Buck IGBT

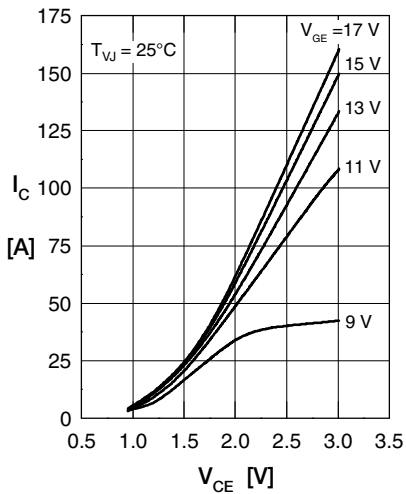


Fig. 1 Typ. output characteristics

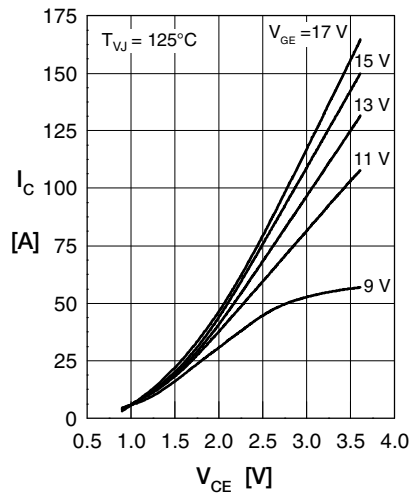


Fig. 2 Typ. output characteristics

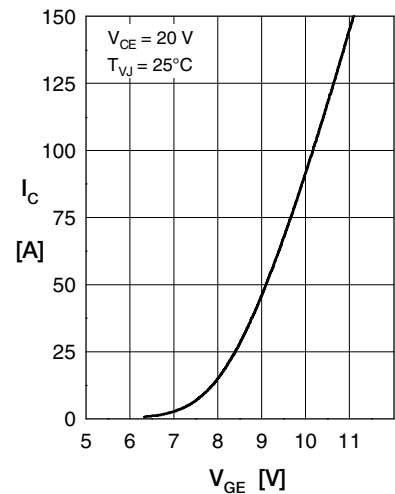


Fig. 3 Typ. transfer characteristics

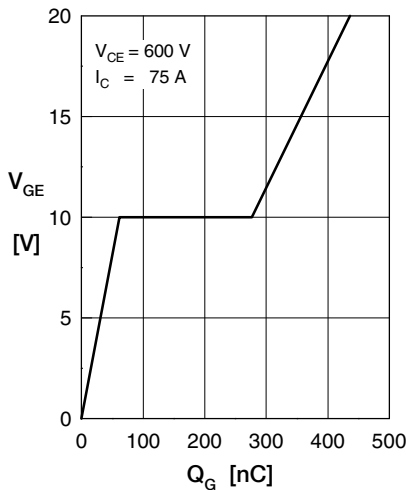


Fig. 4 Typ. turn-on gate charge

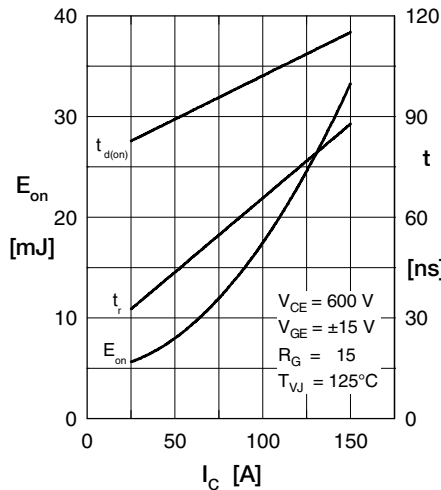


Fig. 5 Typ. turn on energy & switching times versus collector current

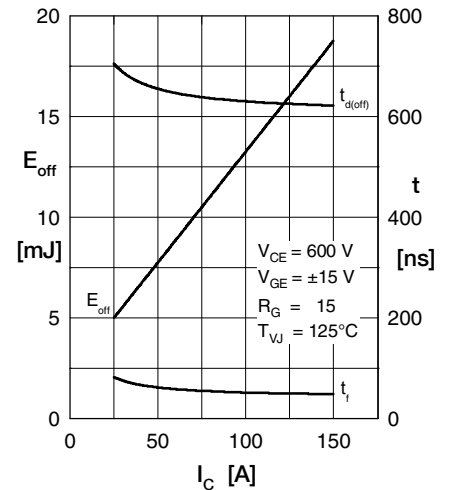


Fig. 6 Typ. turn off energy & switching times versus collector current

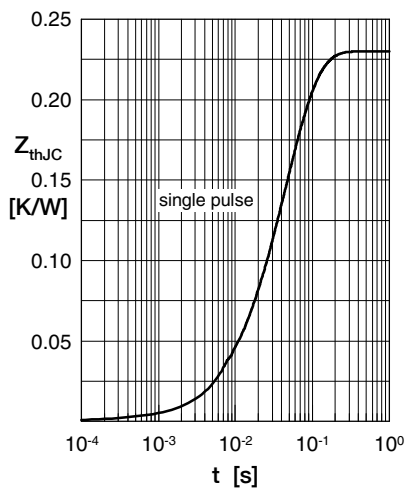


Fig. 12 Typical transient thermal impedance

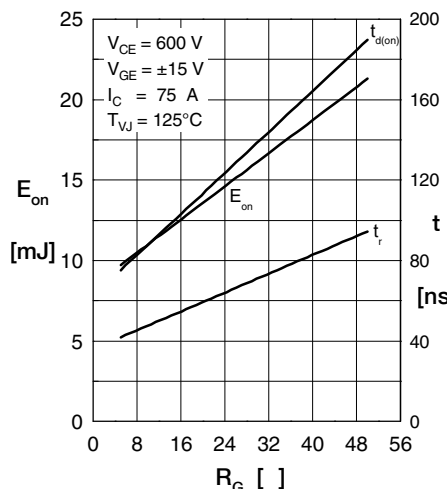


Fig. 9 Typ. turn on energy & switching times versus gate resistor

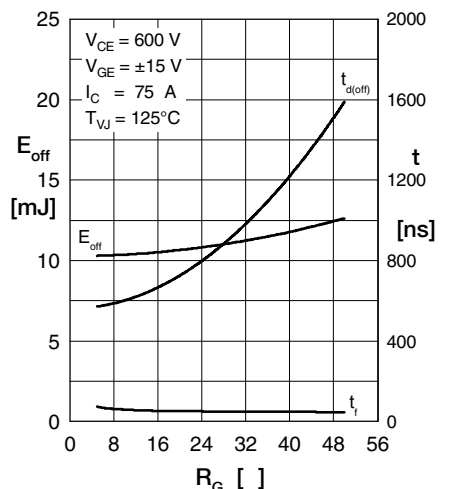


Fig. 9 Typ. turn off energy & switching times versus gate resistor

Buck Diode BD

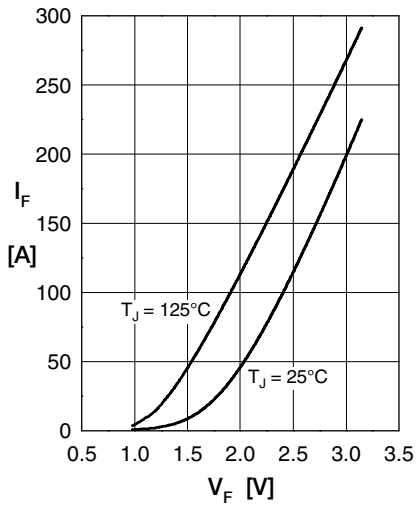


Fig. 1 Typ. Forward current vs. V_F

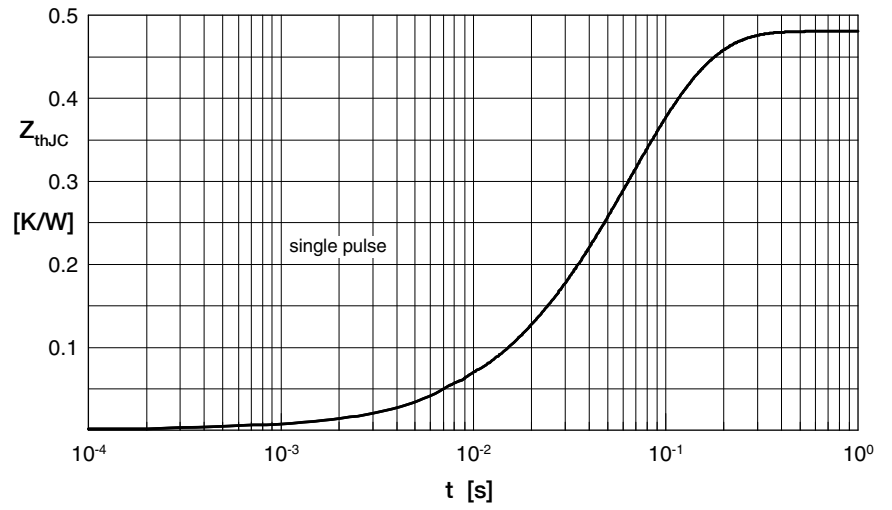


Fig. 2 Typ. transient thermal impedance junction to case