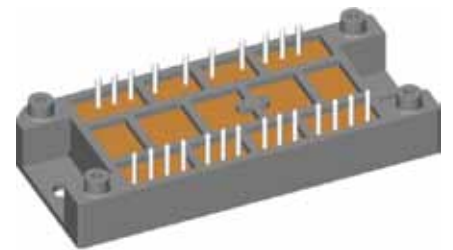
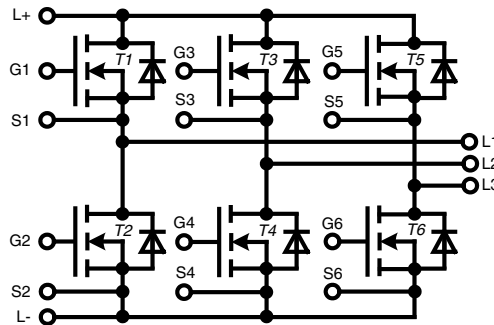


# Three phase full bridge with Trench MOSFETs

$V_{DSS} = 75\text{ V}$   
 $I_{D25} = 270\text{ A}$   
 $R_{DS(on)} = 2.1\text{ m}\Omega$


**MOSFET T1 - T6**

Symbol	Conditions	Maximum Ratings	
$V_{DSS}$	$T_{VJ} = 25^\circ\text{C to } 150^\circ\text{C}$	75	V
$V_{GS}$		$\pm 20$	V
$I_{D25}$	$T_C = 25^\circ\text{C}$	270	A
$I_{D80}$	$T_C = 80^\circ\text{C}$	215	A
$I_{F25}$	$T_C = 25^\circ\text{C (diode)}$	280	A
$I_{F80}$	$T_C = 80^\circ\text{C (diode)}$	180	A

**Applications**
**AC drives**

- in automobiles
  - electric power steering
  - starter generator
- in industrial vehicles
  - propulsion drives
  - fork lift drives
- in battery supplied equipment

**Features**

- MOSFETs in trench technology:
  - low  $R_{DS(on)}$
  - optimized intrinsic reverse diode
- package:
  - high level of integration
  - solder terminals for PCB mounting
  - isolated DCB ceramic base plate with optimized heat transfer

Symbol	Conditions	Characteristic Values			
		$(T_{VJ} = 25^\circ\text{C, unless otherwise specified})$			
		min.	typ.	max.	
$R_{DS(on)}^{1)}$	$V_{GS} = 10\text{ V}; I_D = 100\text{ A};$ on chip level			2.1	$\text{m}\Omega$
$V_{GS(th)}$	$V_{DS} = 20\text{ V}; I_D = 0.5\text{ mA}$	2		4	V
$I_{DSS}$	$V_{DS} = 75\text{ V}; V_{GS} = 0\text{ V}$			10	$\mu\text{A}$
	$T_{VJ} = 25^\circ\text{C}$			300	$\mu\text{A}$
	$T_{VJ} = 125^\circ\text{C}$				
$I_{GSS}$	$V_{GS} = \pm 20\text{ V}; V_{DS} = 0\text{ V}$			0.4	$\mu\text{A}$
$Q_g$	$V_{GS} = 10\text{ V}; V_{DS} = \frac{1}{2}V_{DSS}; I_D = 230\text{ A}$		360		nC
$Q_{gs}$			105		nC
$Q_{gd}$			80		nC
$t_{d(on)}$	inductive load $V_{GS} = 10\text{ V}; V_{DS} = 37\text{ V}$ $I_D = 230\text{ A}; R_G = 10\ \Omega$ $R_G = R_{G\text{ ext}} + R_{\text{out driver}}$ $T_{VJ} = 25^\circ\text{C}$		140		ns
$t_r$			225		ns
$t_{d(off)}$			380		ns
$t_f$			265		ns
$E_{on}$			0.23		mJ
$E_{off}$			3.49		mJ
$E_{rec}$			0.04		mJ
$t_{d(on)}$	inductive load $V_{GS} = 10\text{ V}; V_{DS} = 37\text{ V}$ $I_D = 230\text{ A}; R_G = 10\ \Omega$ $R_G = R_{G\text{ ext}} + R_{\text{out driver}}$ $T_{VJ} = 125^\circ\text{C}$		145		ns
$t_r$			240		ns
$t_{d(off)}$			410		ns
$t_f$			230		ns
$E_{on}$			0.3		mJ
$E_{off}$			2.95		mJ
$E_{rec}$			0.06		mJ
$R_{thJC}$	with heat transfer paste (IXYS test setup)			0.44	K/W
$R_{thJH}$			0.66		K/W

<sup>1)</sup>  $V_{DS} = I_D \cdot (R_{DS(on)} + 2R_{Pin\ to\ chip})$

**Source-Drain Diode**

Symbol	Conditions	Characteristic Values			
		min.	typ.	max.	
(T <sub>VJ</sub> = 25°C, unless otherwise specified)					
V <sub>SD</sub>	I <sub>F</sub> = 100 A; V <sub>GS</sub> = 0 V			1.1	V
t <sub>rr</sub>	I <sub>F</sub> = 230 A; V <sub>R</sub> = 37 V -di <sub>F</sub> /dt = 820 A/μs; R <sub>G</sub> = 10 Ω		85		ns
Q <sub>RM</sub>			2.2		μC
I <sub>RM</sub>			38		A

**Module**

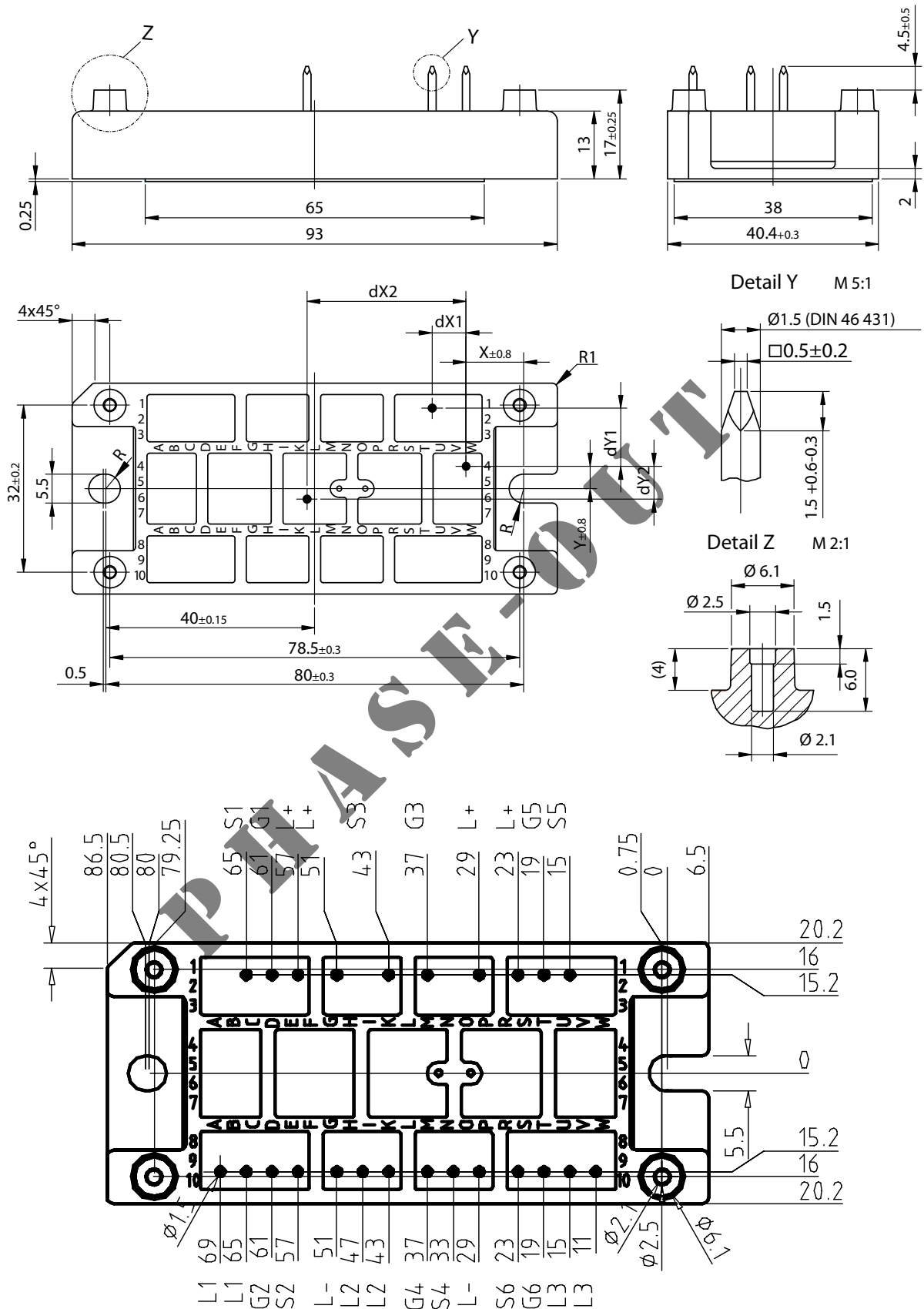
Symbol	Conditions	Maximum Ratings	
T <sub>VJ</sub>		-40...+175	°C
T <sub>stg</sub>		-40...+125	°C
V <sub>ISOL</sub>	I <sub>ISOL</sub> ≤ 1 mA, 50/60 Hz; t = 1 min	500	V~
M <sub>d</sub>	Mounting torque (M5)	2 - 2.5	Nm

Symbol	Conditions	Characteristic Values			
		min.	typ.	max.	
R <sub>pin to chip</sub> <sup>1)</sup>				0.7	mΩ
Weight			80		g

<sup>1)</sup> V<sub>DS</sub> = I<sub>D</sub> · (R<sub>DS(on)</sub> + 2R<sub>Pin to chip</sub>)

PHASE-OUT

Dimensions in mm (1 mm = 0.0394")



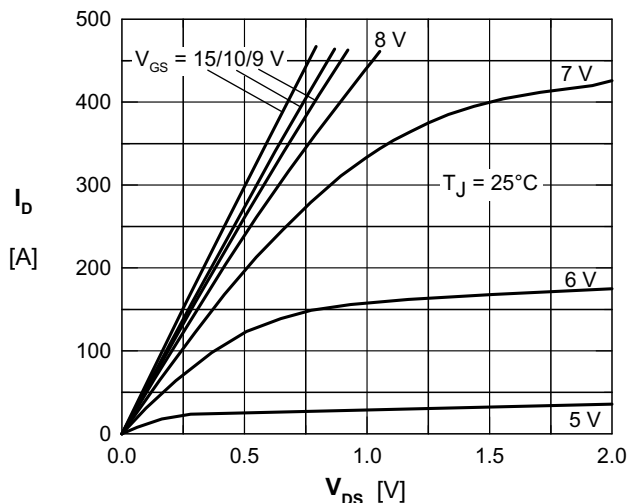


Fig. 1 Typ. Output Characteristics

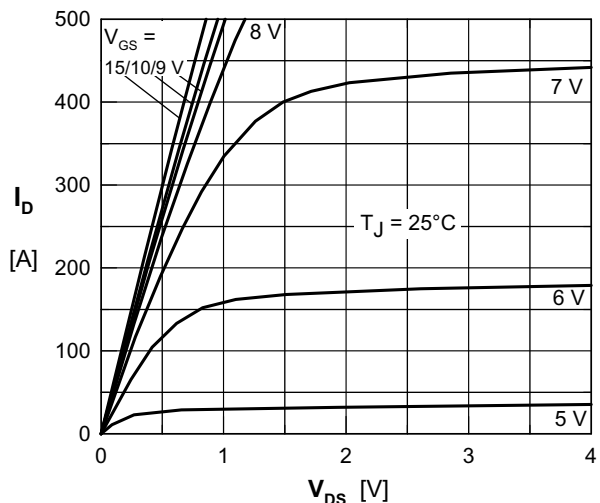


Fig. 2 Typ. Extended Output Characteristics

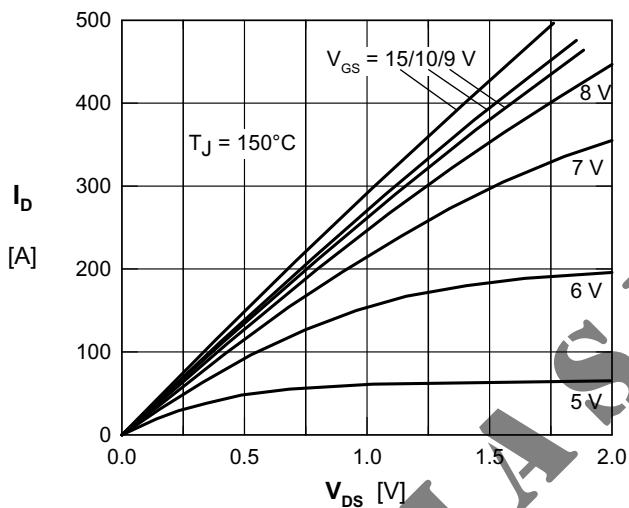


Fig. 3 Typ. Output Characteristics

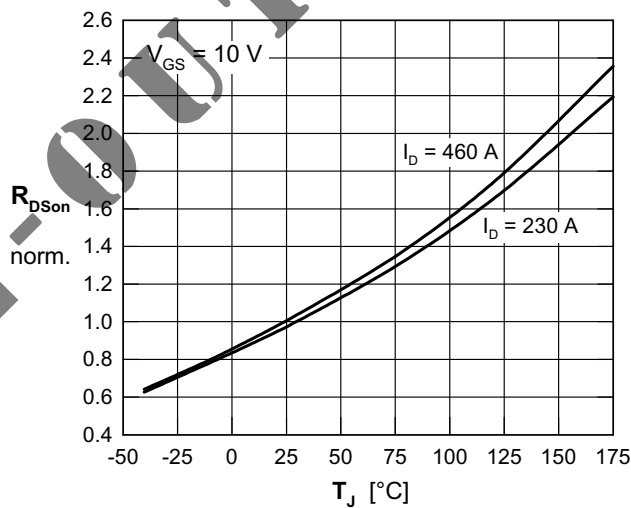


Fig. 4  $R_{DS(on)}$  Normalized to  $I_D = 230$  A Value vs. Junction Temperature

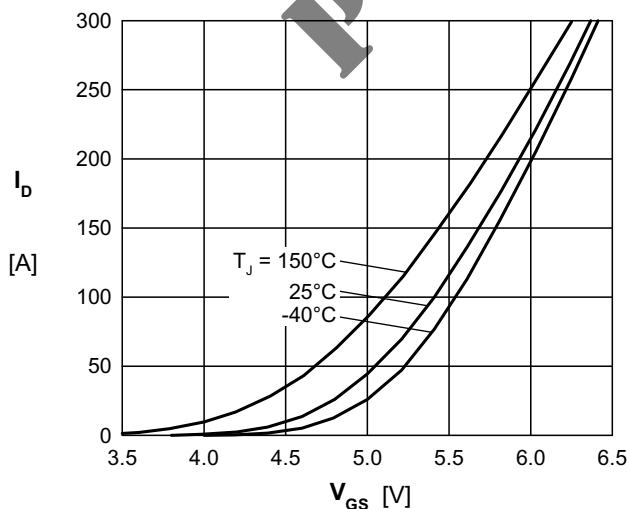


Fig. 5 Typ. Transfer Characteristics

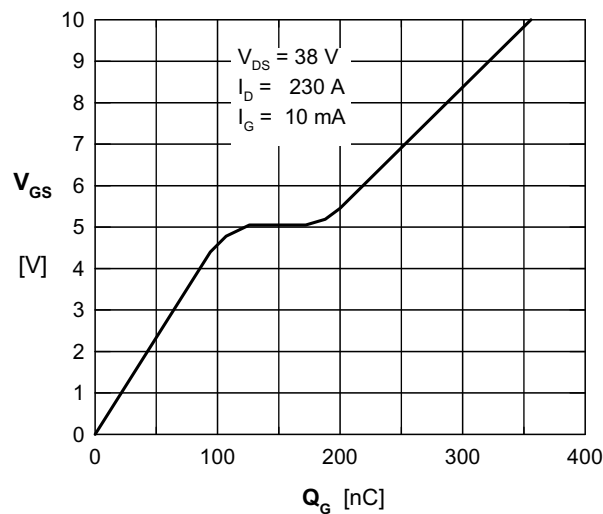


Fig. 6 Typ. Turn-on Gate Charge

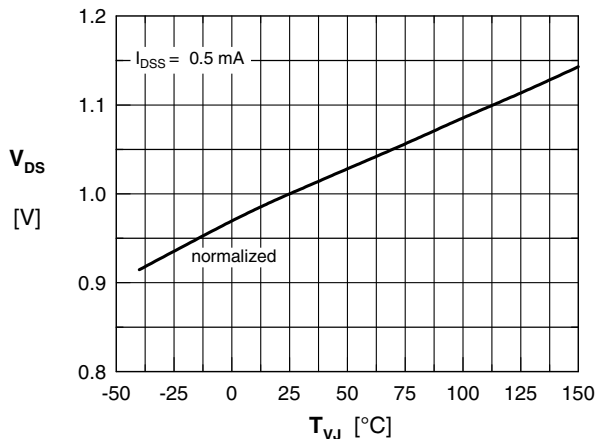


Fig. 7 Typ. Drain source breakdown voltage  $V_{DSS}$  versus junction temperature

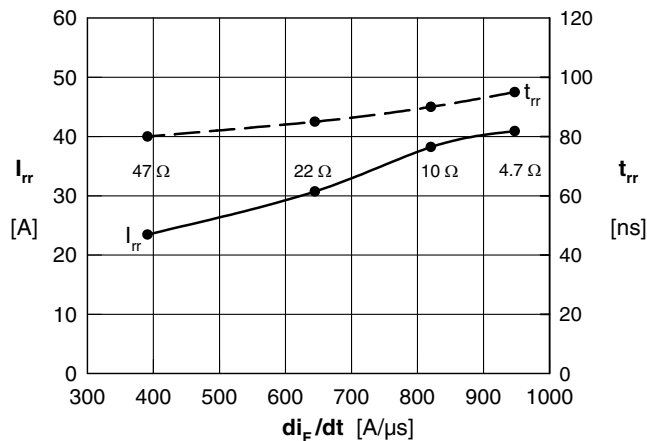


Fig. 8 Typ. Reverse recovery time and current of the body diode versus  $di_F/dt$

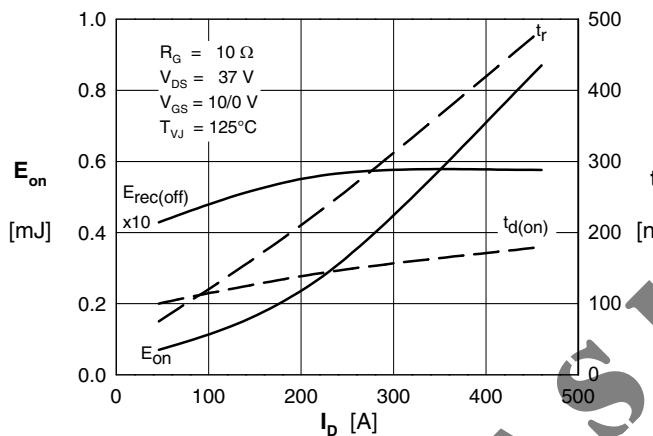


Fig. 9 Typ. turn-on energy & switching times vs. drain current, inductive switching

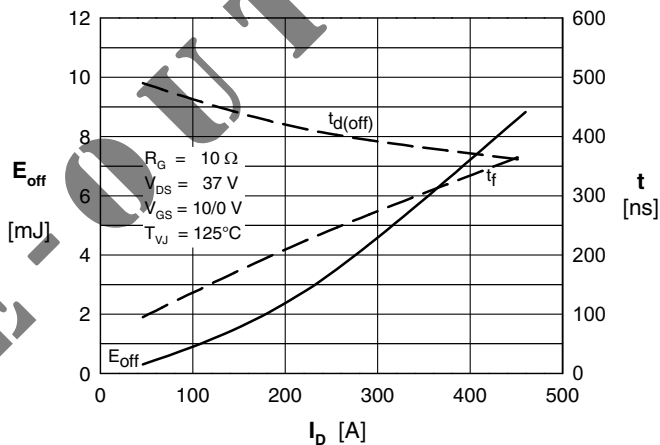


Fig. 10 Typ. turn-off energy & switching times vs. drain current, inductive switching

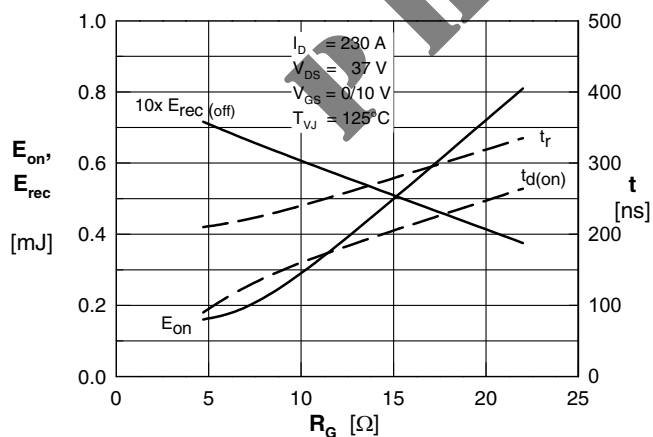


Fig. 11 Typ. turn-on energy & switching times vs. gate resistor, inductive switching

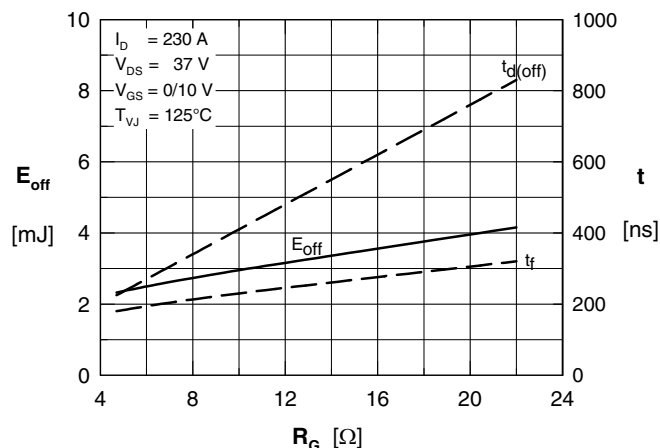


Fig. 12 Typ. turn-off energy & switching times vs. gate resistor, inductive switching

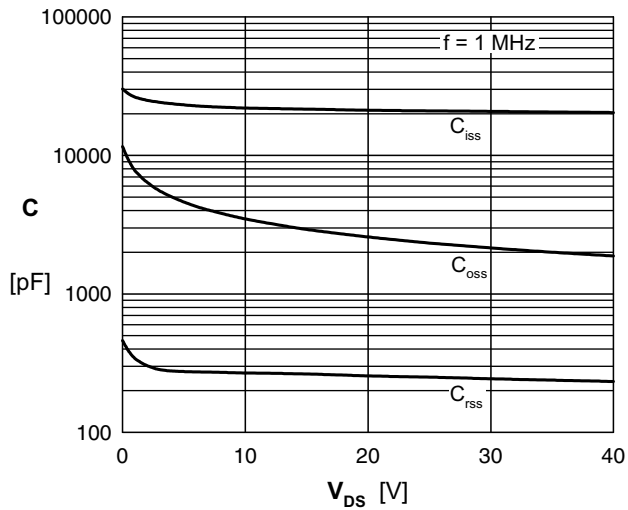


Fig. 13 Typ. Capacitances

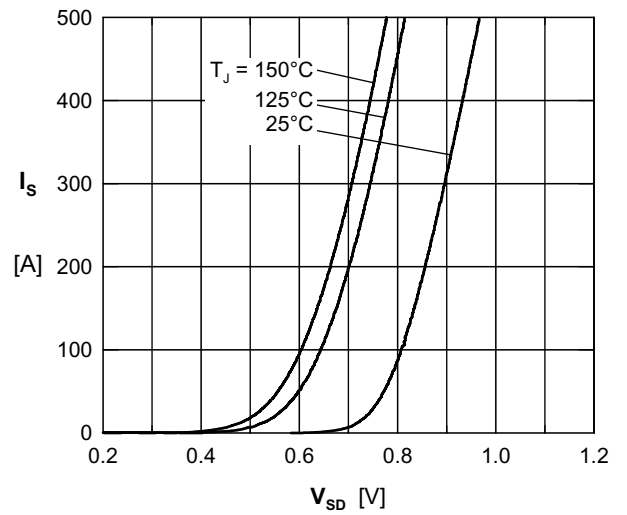


Fig. 14 Typ. Forward Voltage Drop of Intrinsic Diode

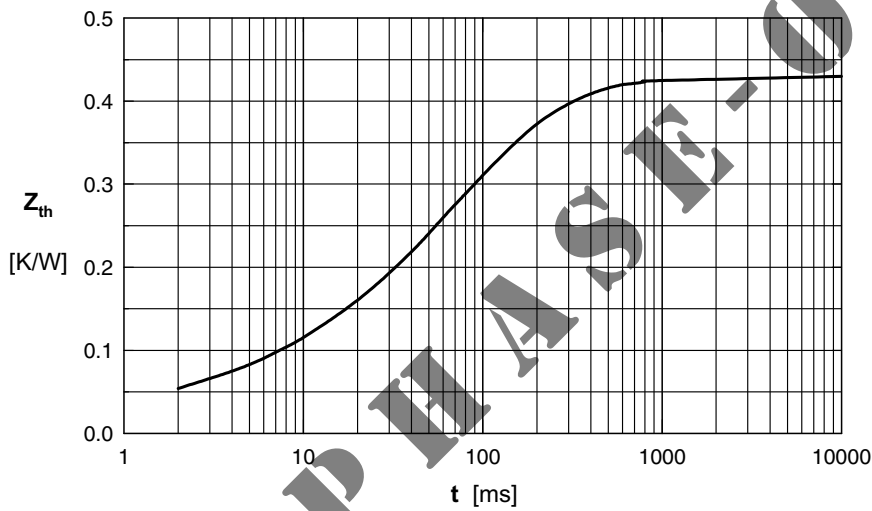


Fig. 15 Typ. Transient Thermal Resistance per MOSFET