

#### FEATURES

- Trench Gate
- Enhancement Mode n-Channel Device
- Non Punch Through Structure
- High Switching Speed
- Low On-state Saturation Voltage
- High Input Impedance Simplifies Gate Drive
- Latch-Free Operation
- Fully Short Circuit Rated To 10 $\mu$ s
- Wide RBSOA

#### APPLICATIONS

- High Frequency Inverters
- Motor Control
- Switched Mode Power Supplies
- High Frequency Welding
- UPS Systems
- PWM Drives

The DIM25HTT12-B000 is a robust non punch through trench gate n-channel, enhancement mode insulated gate bipolar transistor (IGBT) module designed for low power dissipation in a wide range of low to medium voltage applications such as power supplies and motor drives. Trench Gate technology offers significant improvements when compared with conventional planar IGBTs. The high impedance gate simplifies gate drive considerations, allowing operation directly from low power control circuitry.

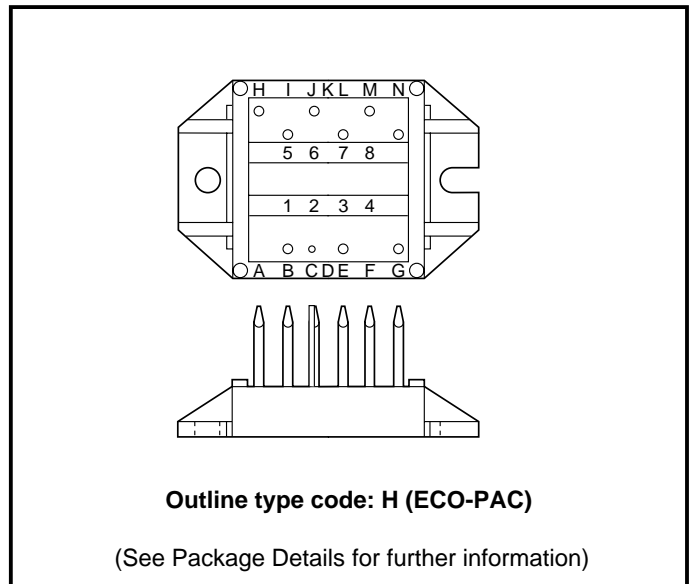
Low saturation voltages minimise power dissipation, thereby reducing the running cost of the overall system in which they are used.

The DIM25HTT12-B000 is fully short circuit rated making it especially suited for motor control and other arduous applications.

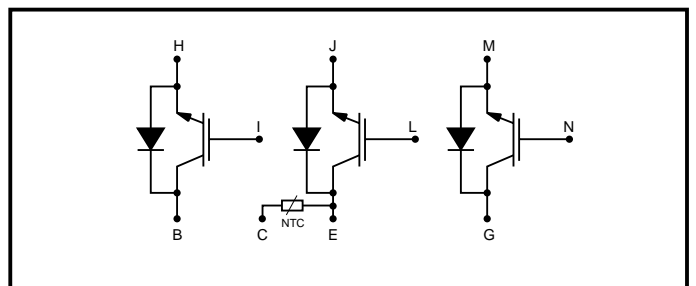
Typical applications include high frequency inverters for motor control, PWM, welding and heating apparatus. The Powerline range of IGBTs is also applicable to switched mode and uninterruptible power supplies.

#### KEY PARAMETERS

$V_{CES}$	(max)	1200V
$V_{CE(sat)}$	(typ)	1.9V
$I_{C25}$	(max)	35A
$I_{C75}$	(max)	25A
$I_{CM}$	(max)	75A
$t_{sc}$	(max)	10 $\mu$ s



**Fig.1 Pin connections - top view (not to scale)**



**Fig.2 DIM25HTT12-B000 circuit**

#### Ordering Information

**Order as:**  
DIM25HTT12-B000

Note: When ordering use complete part number.

## ABSOLUTE MAXIMUM RATINGS

Stresses above those listed under 'Absolute Maximum Ratings' may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to Absolute Maximum Ratings for extended periods may affect device reliability.

$T_{case} = 25^{\circ}\text{C}$  unless stated otherwise.

Symbol	Parameter	Test Conditions	Max.	Units
$V_{CES}$	Collector-emitter voltage	$V_{GE} = 0\text{V}$	1200	V
$V_{GES}$	Gate-emitter voltage	-	$\pm 20$	V
$I_{C25}$	Continuous collector current	$T_{case} = 25^{\circ}\text{C}$	35	A
$I_{C75}$	Continuous collector current	$T_{case} = 75^{\circ}\text{C}$	25	A
$I_{CM}$	Pulsed collector current	1ms, $T_{case} = 75^{\circ}\text{C}$	75	A
$P_{tot}$	Power dissipation	$T_{case} = 75^{\circ}\text{C}$	45	W
$V_{isol}$	Isolating voltage	$I_{isol} \leq 1\text{mA}$ , 50/60Hz, $t = 1\text{ min}$	3000	$V_{ac}$

## Thermal And Mechanical Ratings

Symbol	Parameter	Conditions	Min.	Max.	Units
$R_{th(j-c)}$	Thermal resistance - IGBT - per device	DC junction to case	-	1.65	$^{\circ}\text{C/W}$
$R_{th(j-c)}$	Thermal resistance - Diode - per device	DC junction to case	-	4.0	$^{\circ}\text{C/W}$
$T_j$	Operating junction temperature range	-	-40	150	$^{\circ}\text{C}$
$T_{stg}$	Storage temperature range	-	-40	150	$^{\circ}\text{C}$
-	Mounting torque	M4 Screw	1.5	2.0	Nm

**DC ELECTRICAL CHARACTERISTICS**
 **$T_{case} = 25^{\circ}\text{C}$  unless stated otherwise.**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$I_{CES}$	Collector cut-off current	$V_{GE} = 0\text{V}, V_{CE} = 1200\text{V}$	-	-	0.2	mA
		$V_{GE} = 0\text{V}, V_{CE} = 1200\text{V}, T_c = 125^{\circ}\text{C}$	-	-	1	mA
$I_{GES}$	Gate leakage current	$V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$	-	-	$\pm 500$	nA
$V_{GE(TH)}$	Gate threshold voltage	$I_C = 1\text{mA}, V_{CE} = V_{GE}$	-	7	-	V
$V_{CE(SAT)}$	Collector-emitter saturation voltage	$V_{GE} = 15\text{V}, I_C = 25\text{A}$	-	1.9	2.3	V
		$V_{GE} = 15\text{V}, I_C = 25\text{A}, T_c = 125^{\circ}\text{C}$	-	2.1	-	V

**AC ELECTRICAL CHARACTERISTICS**
 **$T_{case} = 25^{\circ}\text{C}$  unless stated otherwise.**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$C_{ies}$	Input capacitance	$V_{CE} = 75\text{V}, V_{GE} = 15\text{V}, f = 1\text{MHz}$	-	4000	-	pF
$C_{oes}$	Output capacitance	$V_{CE} = 75\text{V}, V_{GE} = 15\text{V}, f = 1\text{MHz}$	-	170	-	pF
$C_{res}$	Reverse transfer capacitance	$V_{CE} = 75\text{V}, V_{GE} = 15\text{V}, f = 1\text{MHz}$	-	25	-	pF

**SHORT CIRCUIT RATING**
 **$T_{case} = 125^{\circ}\text{C}$  unless stated otherwise.**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$t_{sc}$	Short circuit withstand time	$V_{GE} = 15\text{V}, V_{CE} = 80\% V_{CES}$	-	-	10	$\mu\text{s}$

## INDUCTIVE SWITCHING CHARACTERISTICS

$T_{case} = 25^{\circ}\text{C}$  unless stated otherwise.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$t_{d(ON)}$	Turn-on delay time	$I_C = 25\text{A}$ $V_{GE} = \pm 15\text{V}$ , $V_{CE} = 50\%V_{ces}$ $R_G = 5\Omega$	-	160	-	ns
$t_r$	Rise time		-	15	-	ns
$E_{ON}$	Turn-on energy loss - per cycle		-	1.5	-	mJ
$t_{d(OFF)}$	Turn-off delay time		-	270	-	ns
$t_f$	Fall time		-	40	-	ns
$E_{OFF}$	Turn-off energy loss - per cycle		-	2.5	-	mJ

$T_{case} = 125^{\circ}\text{C}$  unless stated otherwise.

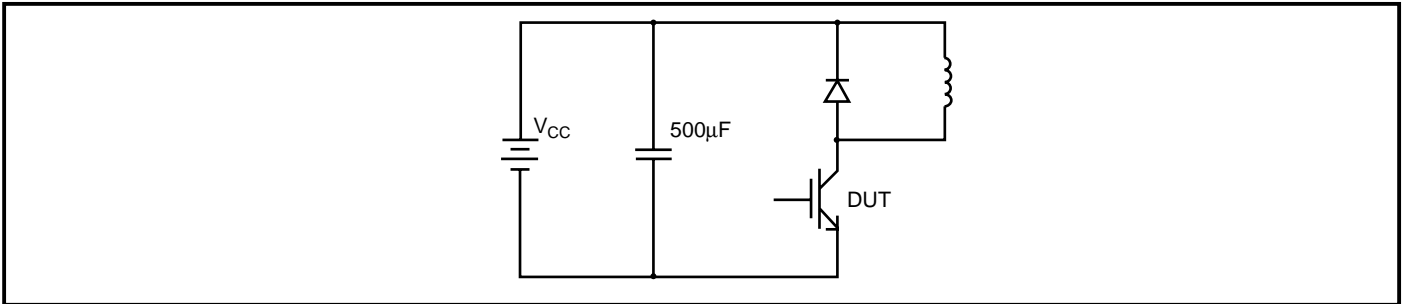
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$t_{d(ON)}$	Turn-on delay time	$I_C = 25\text{A}$ $V_{GE} = \pm 15\text{V}$ , $V_{CE} = 50\%V_{ces}$ $R_G = 5\Omega$	-	170	-	ns
$t_r$	Rise time		-	17	-	ns
$E_{ON}$	Turn-on energy loss - per cycle		-	2	-	mJ
$t_{d(OFF)}$	Turn-off delay time		-	340	-	ns
$t_f$	Fall time		-	60	-	ns
$E_{OFF}$	Turn-off energy loss - per cycle		-	3.5	-	mJ

## DIODE CHARACTERISTICS

$T_c = 25^{\circ}\text{C}$  unless stated otherwise.

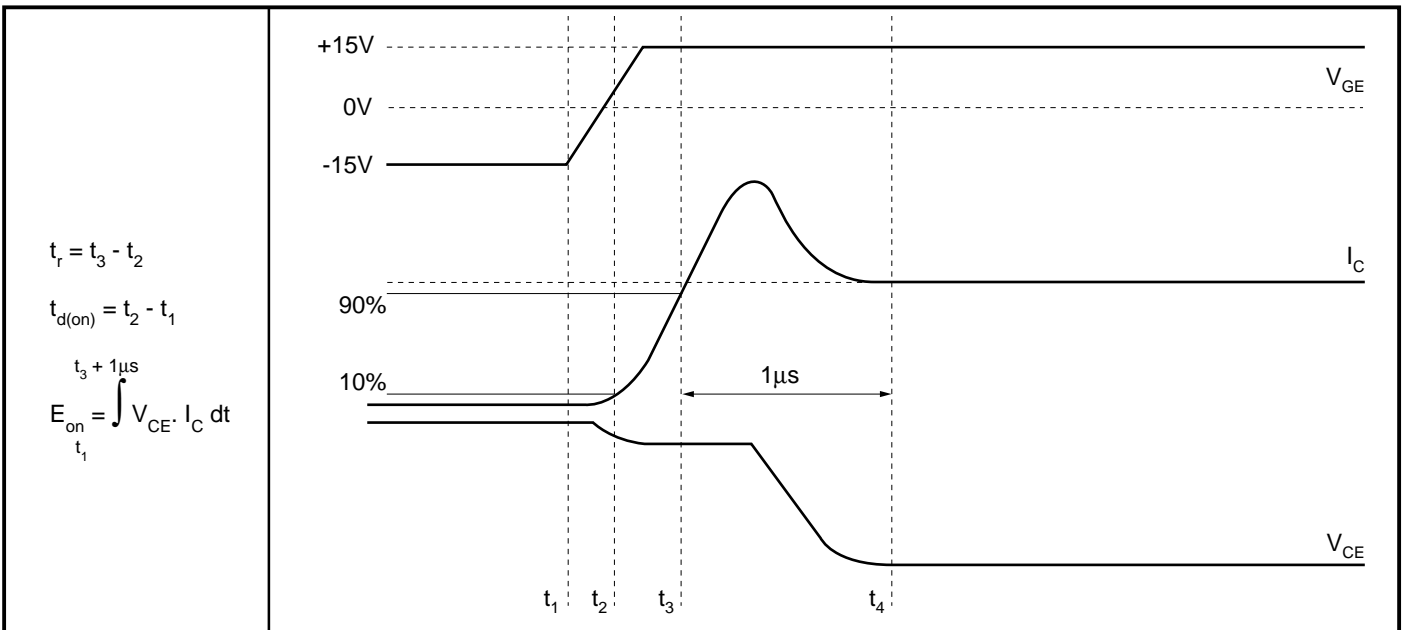
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$V_{FM}$	Forward voltage	At $I_F = 25\text{A}$ peak	-	1.9	-	V
		At $I_F = 25\text{A}$ peak, $T_{case} = 125^{\circ}\text{C}$	-	1.92	-	V
$t_{rr}$	Reverse recovery time	$I_F = 25\text{A}$ , $di_{RR}/dt = 200\text{A}/\mu\text{s}$	-	90	-	ns
$I_{RRM}$	Reverse recovery current	$V_R = 50\%V_{RRM}$	-	12	-	A

**BASIC TEST CIRCUIT**



**Fig.3 Basic d.c. chopper circuit**

**SWITCHING DEFINITIONS**



**Fig.4 Turn-on characteristics**

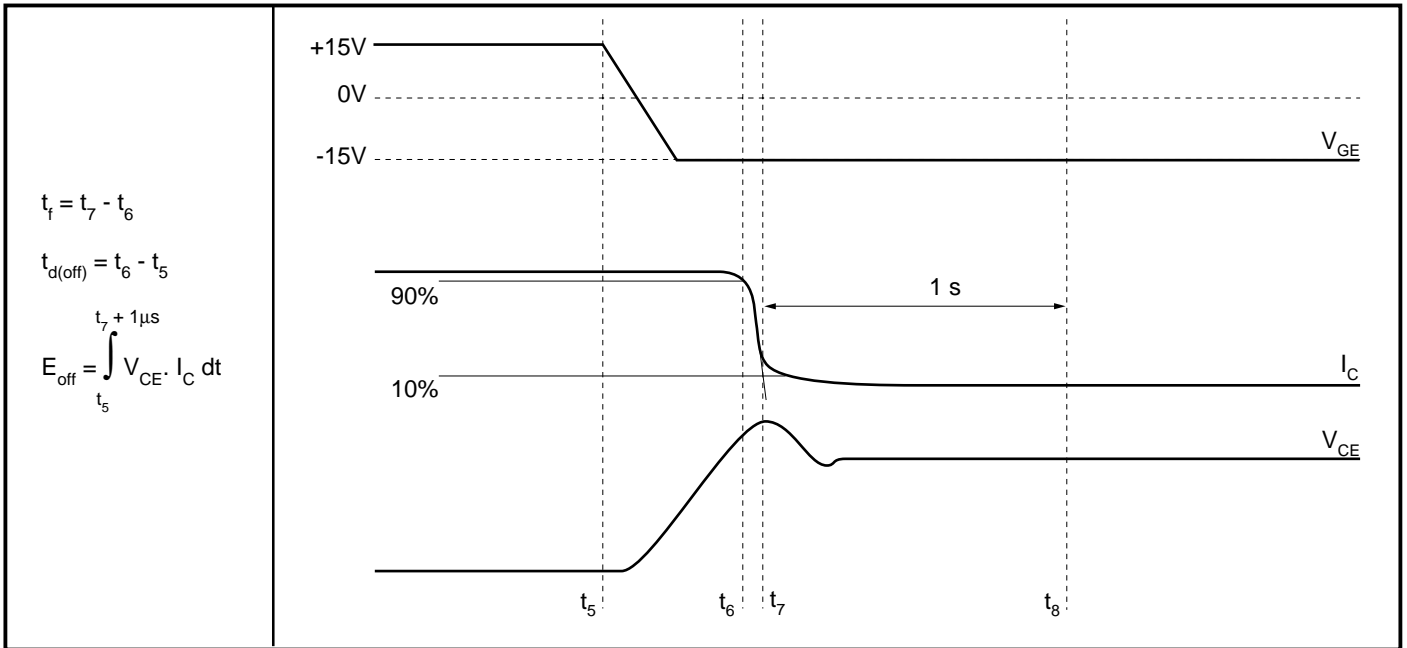


Fig.5 Turn-off characteristics

**CURVES**

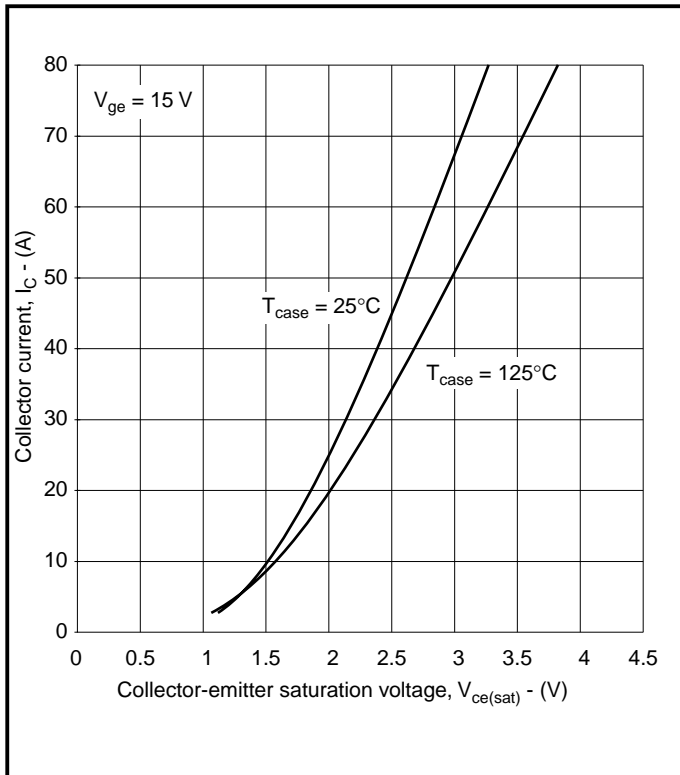


Fig.6 Typical output characteristics

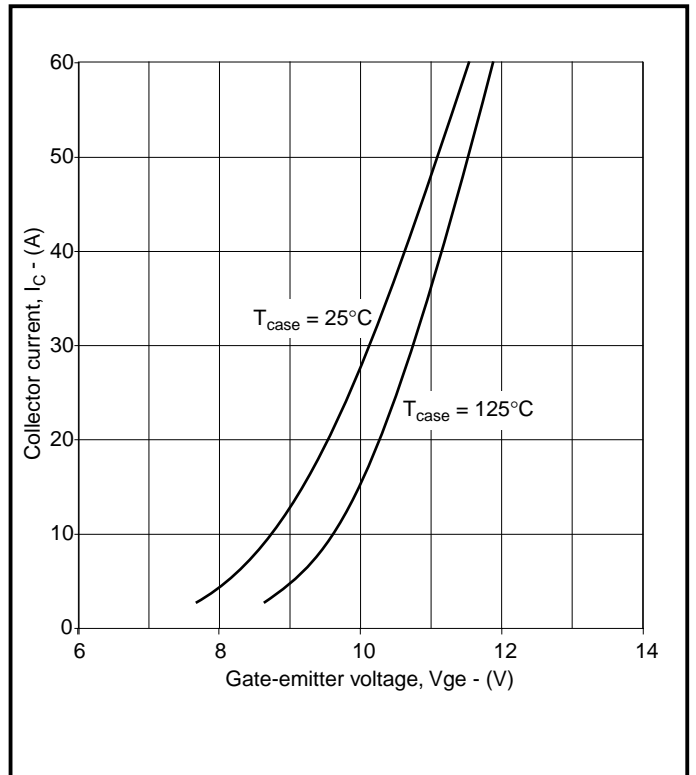
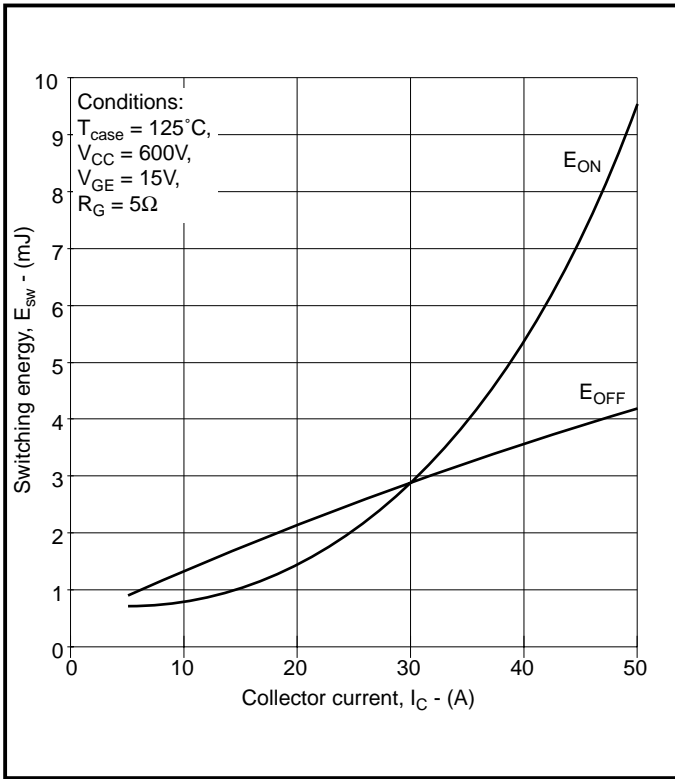
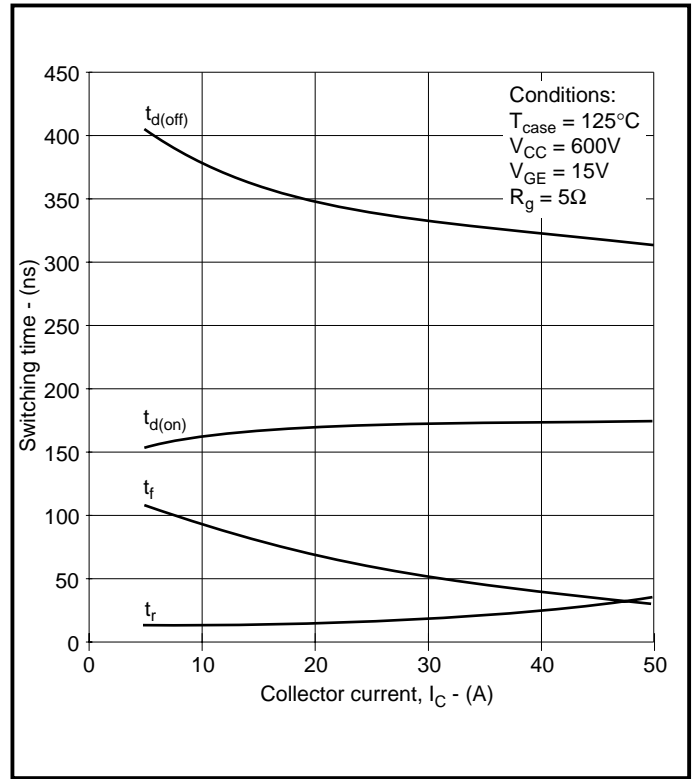


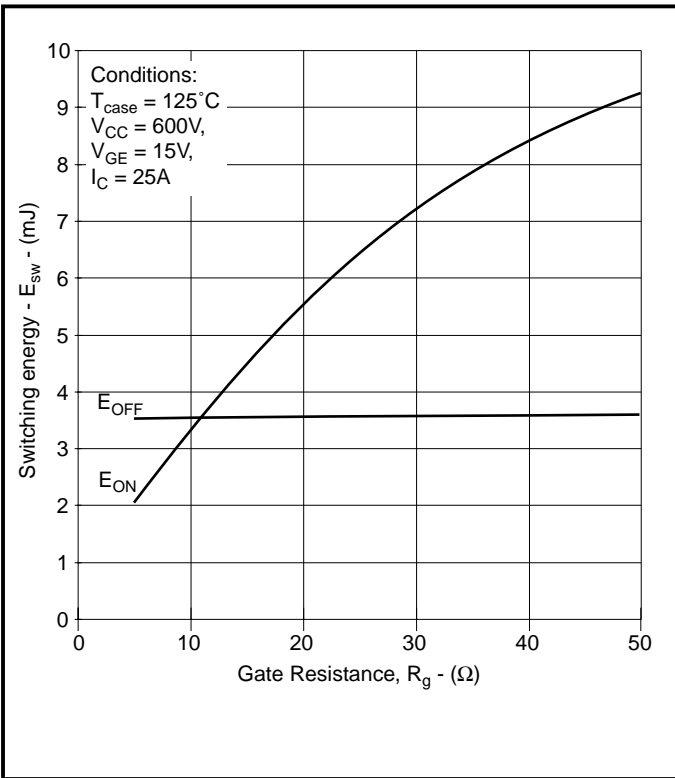
Fig.7 Typical transfer characteristics



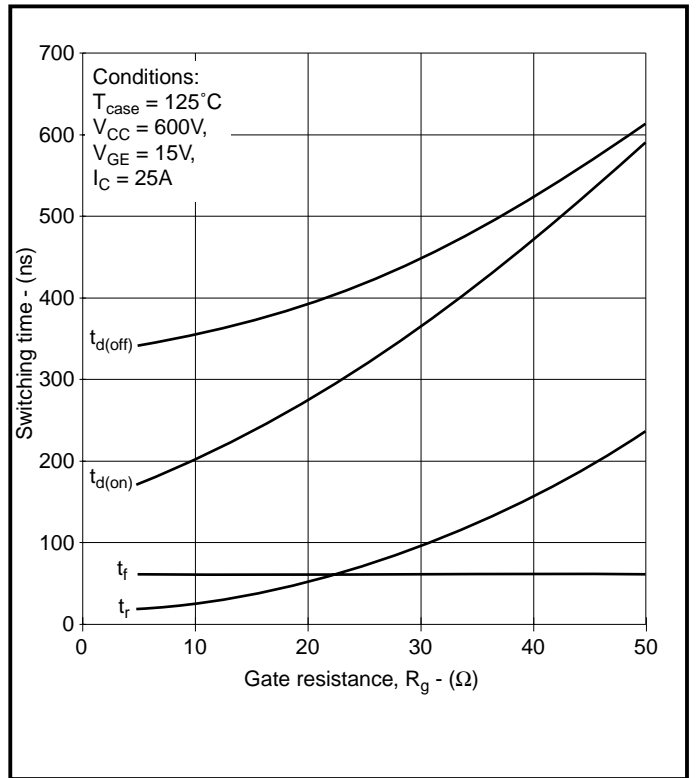
**Fig.8 Typical switching losses vs collector current**



**Fig.9 Typical switching times vs collector current**



**Fig.10 Typical switching losses vs gate resistance**



**Fig.11 Typical switching times vs gate resistance**

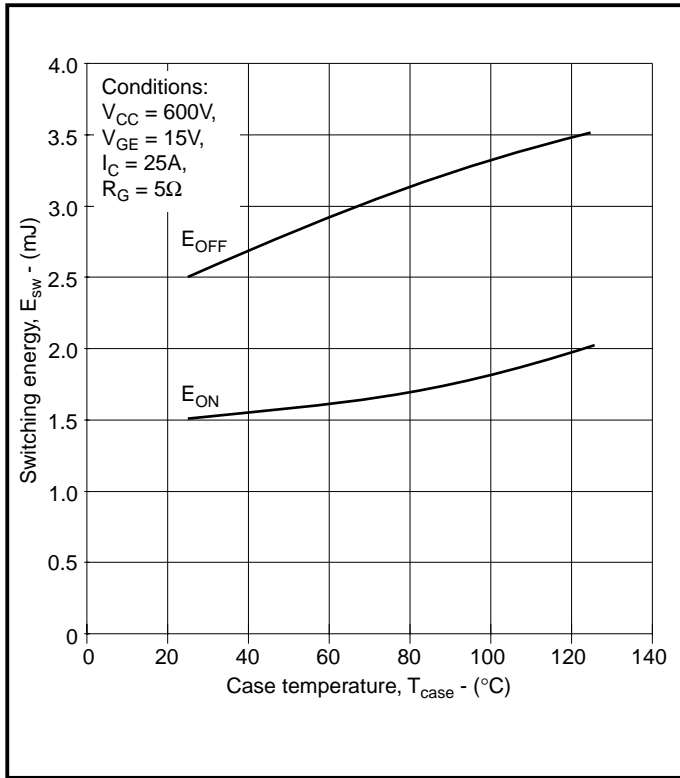


Fig.12 Typical switching losses vs case temperature

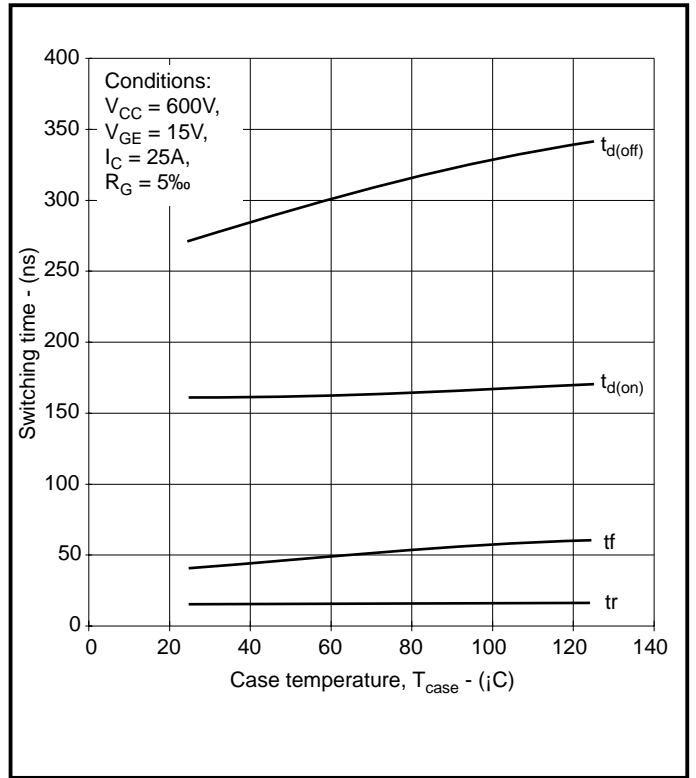


Fig.13 Typical switching times vs case temperature

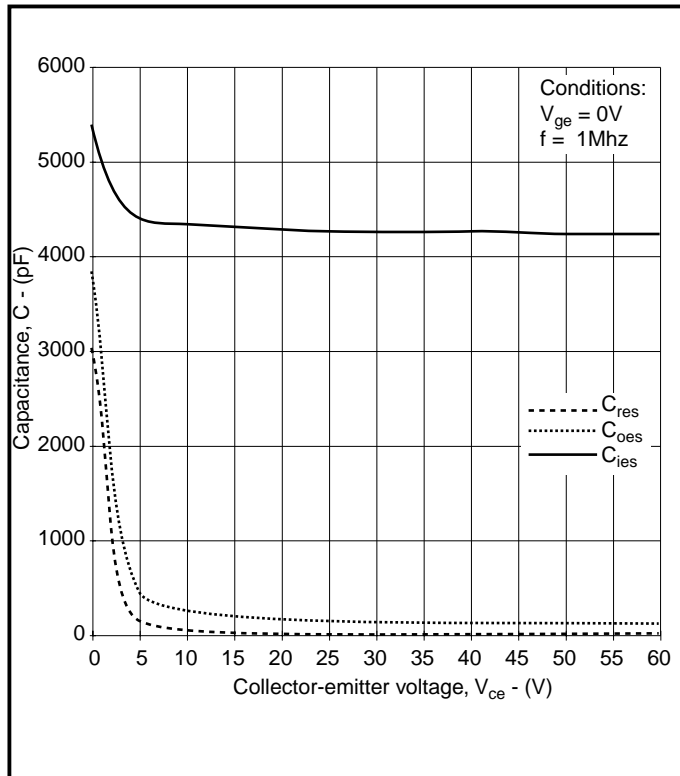


Fig.14 Typical capacitance

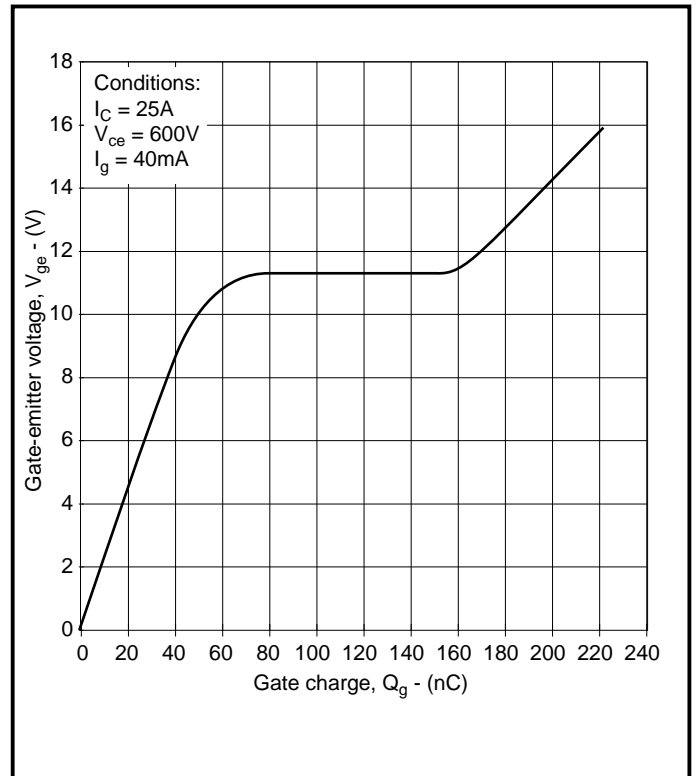
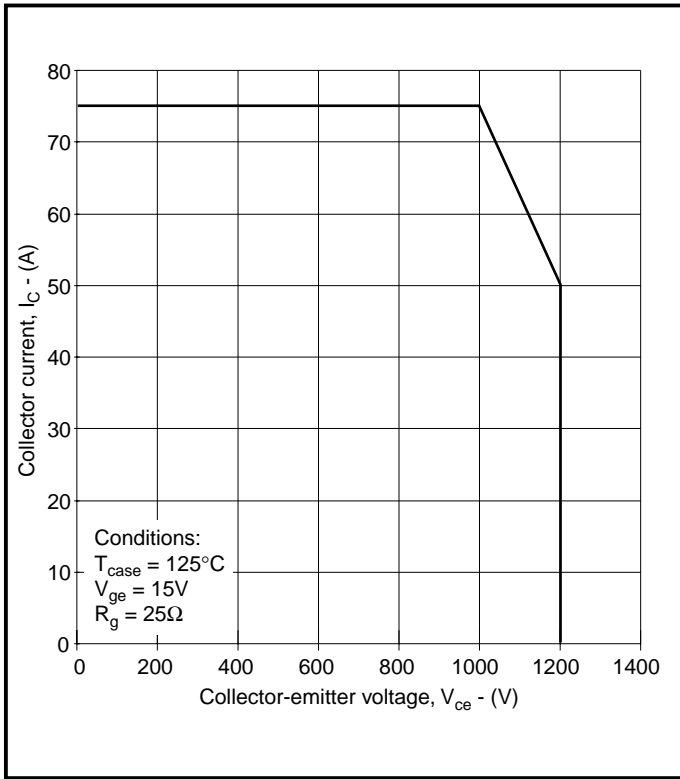
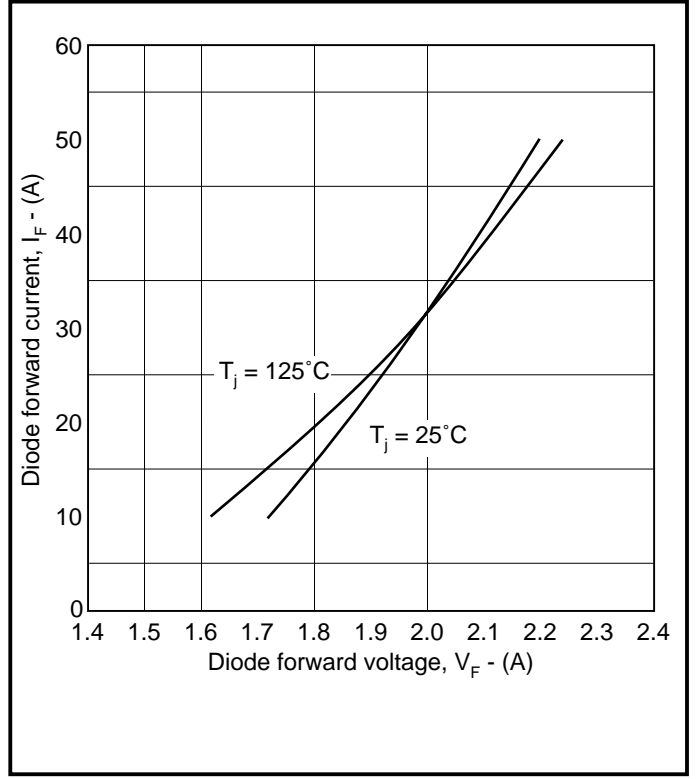


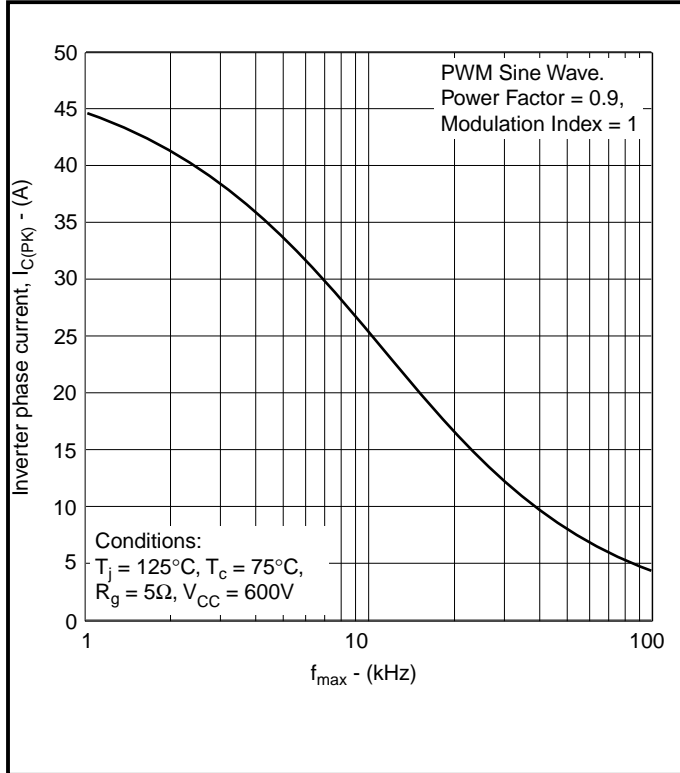
Fig.15 Typical gate charge



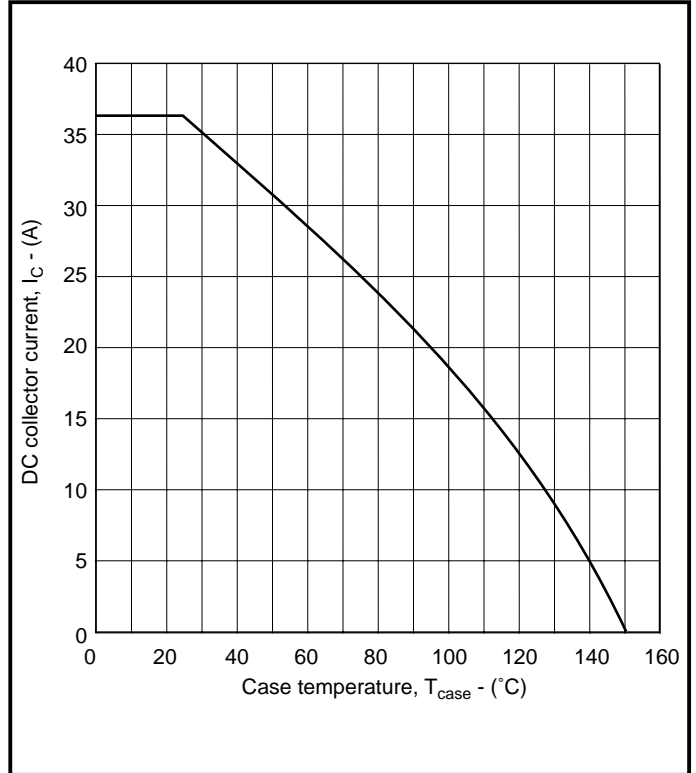
**Fig.16 Reverse bias safe operating area**



**Fig.17 Diode typical forward characteristics**



**Fig.18 3-Phase PWM inverter operating frequency**

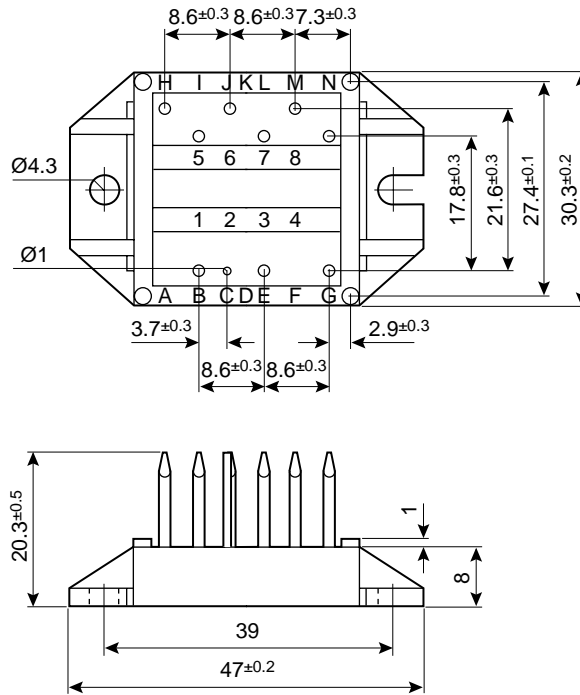


**Fig.19 DC current rating vs case temperature**

Caution: This device is sensitive to electrostatic discharge. Users should follow ESD handling procedures.

**PACKAGE DETAILS**

For additional package information, please contact your nearest representative or Dynex Semiconductor Customer Service Centre. All dimensions in mm, unless stated otherwise. **DO NOT SCALE.**



**Package outline type: H (ECO-PAC)**



<http://www.dynexsemi.com>

**e-mail: [power\\_solutions@dynexsemi.com](mailto:power_solutions@dynexsemi.com)**

HEADQUARTERS OPERATIONS  
**DYNEX SEMICONDUCTOR LTD**  
Doddington Road, Lincoln.  
Lincolnshire. LN6 3LF. United Kingdom.  
Tel: 00-44-(0)1522-500500  
Fax: 00-44-(0)1522-500550

**DYNEX POWER INC.**  
99 Bank Street, Suite 410,  
Ottawa, Ontario, Canada, K1P 6B9  
Tel: 613.723.7035  
Fax: 613.723.1518  
Toll Free: 1.888.33.DYNEX (39639)

CUSTOMER SERVICE CENTRES  
**Mainland Europe** Tel: +33 (0)1 58 04 91 00. Fax: +33 (0)1 46 38 51 33  
**North America** Tel: (613) 723-7035. Fax: (613) 723-1518.  
**UK, Scandinavia & Rest Of World** Tel: +44 (0)1522 500500. Fax: +44 (0)1522 500020

SALES OFFICES  
**Mainland Europe** Tel: +33 (0)1 58 04 91 00. Fax: +33 (0)1 46 38 51 33  
**North America** Tel: (613) 723-7035. Fax: (613) 723-1518. Toll Free: 1.888.33.DYNEX (39639) /  
Tel: (949) 733-3005. Fax: (949) 733-2986.  
**UK, Scandinavia & Rest Of World** Tel: +44 (0)1522 500500. Fax: +44 (0)1522 500020

These offices are supported by Representatives and Distributors in many countries world-wide.  
© Dynex Semiconductor 2000 Publication No. DS5353-3 Issue No. 3.0 July 2000  
TECHNICAL DOCUMENTATION – NOT FOR RESALE. PRINTED IN UNITED KINGDOM

**Datasheet Annotations:**

Dynex Semiconductor annotate datasheets in the top right hand corner of the front page, to indicate product status. The annotations are as follows:-

**Target Information:** This is the most tentative form of information and represents a very preliminary specification. No actual design work on the product has been started.

**Preliminary Information:** The product is in design and development. The datasheet represents the product as it is understood but details may change.

**Advance Information:** The product design is complete and final characterisation for volume production is well in hand.

**No Annotation:** The product parameters are fixed and the product is available to datasheet specification.

This publication is issued to provide information only which (unless agreed by the Company in writing) may not be used, applied or reproduced for any purpose nor form part of any order or contract nor to be regarded as a representation relating to the products or services concerned. No warranty or guarantee express or implied is made regarding the capability, performance or suitability of any product or service. The Company reserves the right to alter without prior notice the specification, design or price of any product or service. Information concerning possible methods of use is provided as a guide only and does not constitute any guarantee that such methods of use will be satisfactory in a specific piece of equipment. It is the user's responsibility to fully determine the performance and suitability of any equipment using such information and to ensure that any publication or data used is up to date and has not been superseded. These products are not suitable for use in any medical products whose failure to perform may result in significant injury or death to the user. All products and materials are sold and services provided subject to the Company's conditions of sale, which are available on request.

All brand names and product names used in this publication are trademarks, registered trademarks or trade names of their respective owners.

Caution: This device is sensitive to electrostatic discharge. Users should follow ESD handling procedures.

11/11