

#### 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 DIM25HHT12-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.

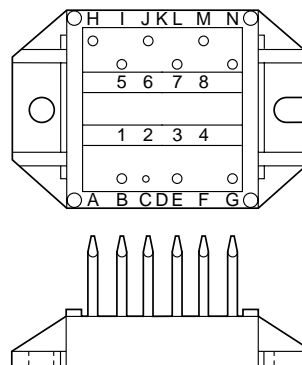
Low saturation voltages minimise power dissipation, thereby reducing the running cost of the overall system in which they are used.

The DIM25HHT12-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



Outline type code: H (ECO-PAC)

(See Package Details for further information)

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

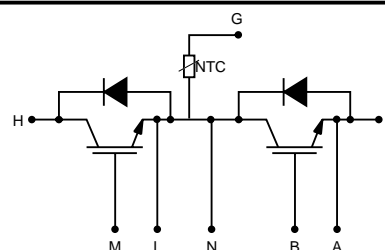


Fig.2 DIM25HHT12-B000 circuit

#### ORDERING INFORMATION

Order as:  
DIM25HHT12-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	$V_{CE} = 75\text{V}, V_{GE} = 15\text{V}, f = 1\text{MHz}$	-	-	-	pF
$C_{oes}$	Output capacitance	$V_{CE} = 75\text{V}, V_{GE} = 15\text{V}, f = 1\text{MHz}$	-	-	-	pF
$C_{res}$	Reverse transfer capacitance	$V_{CE} = 75\text{V}, V_{GE} = 15\text{V}, f = 1\text{MHz}$	-	-	-	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

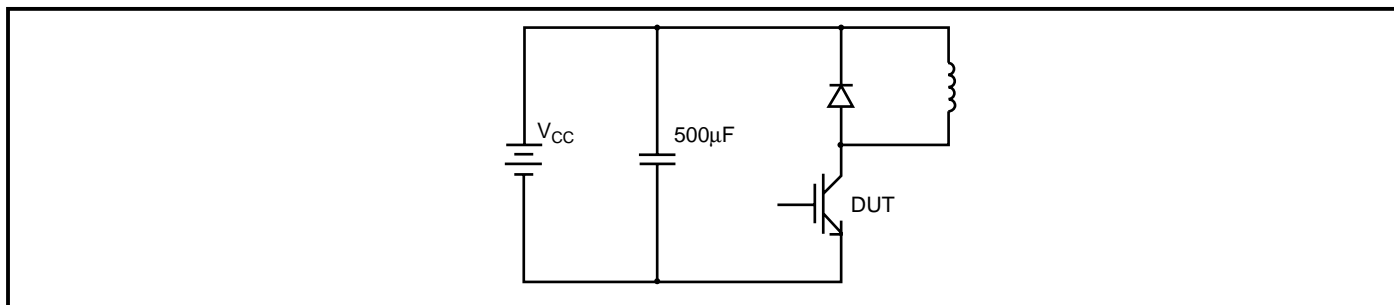


Fig.3 Basic d.c. chopper circuit

## SWITCHING DEFINITIONS

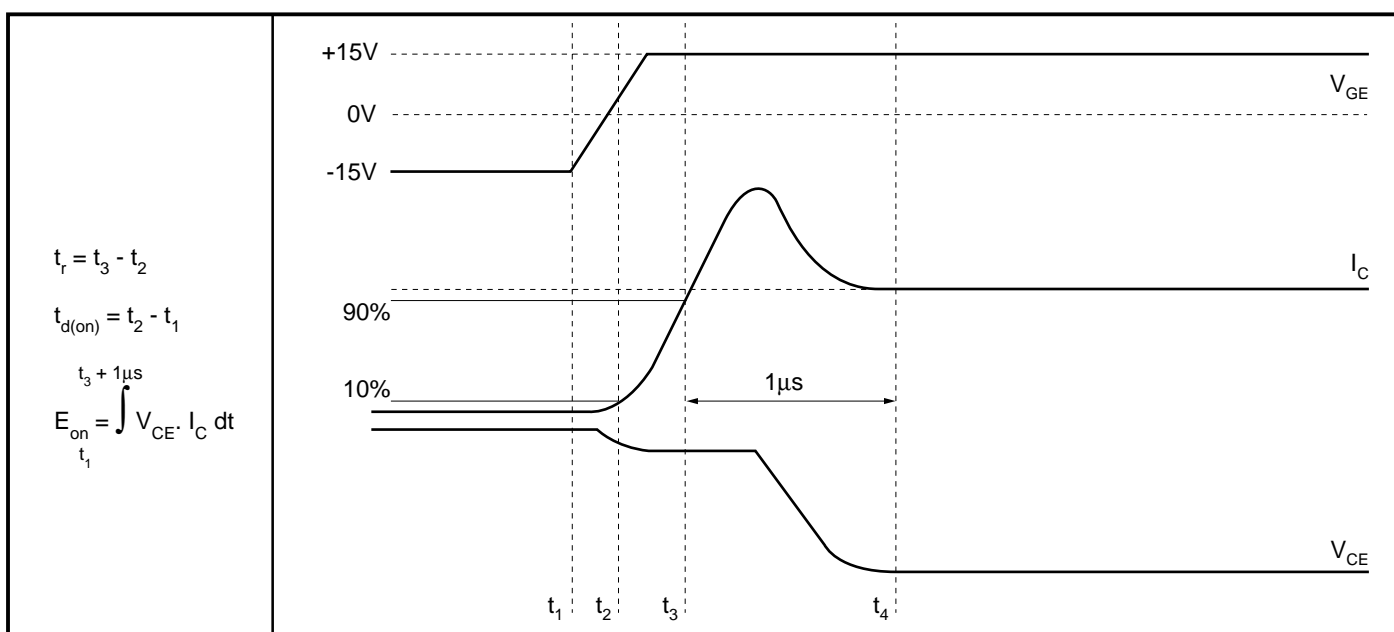


Fig.4 Turn-on characteristics

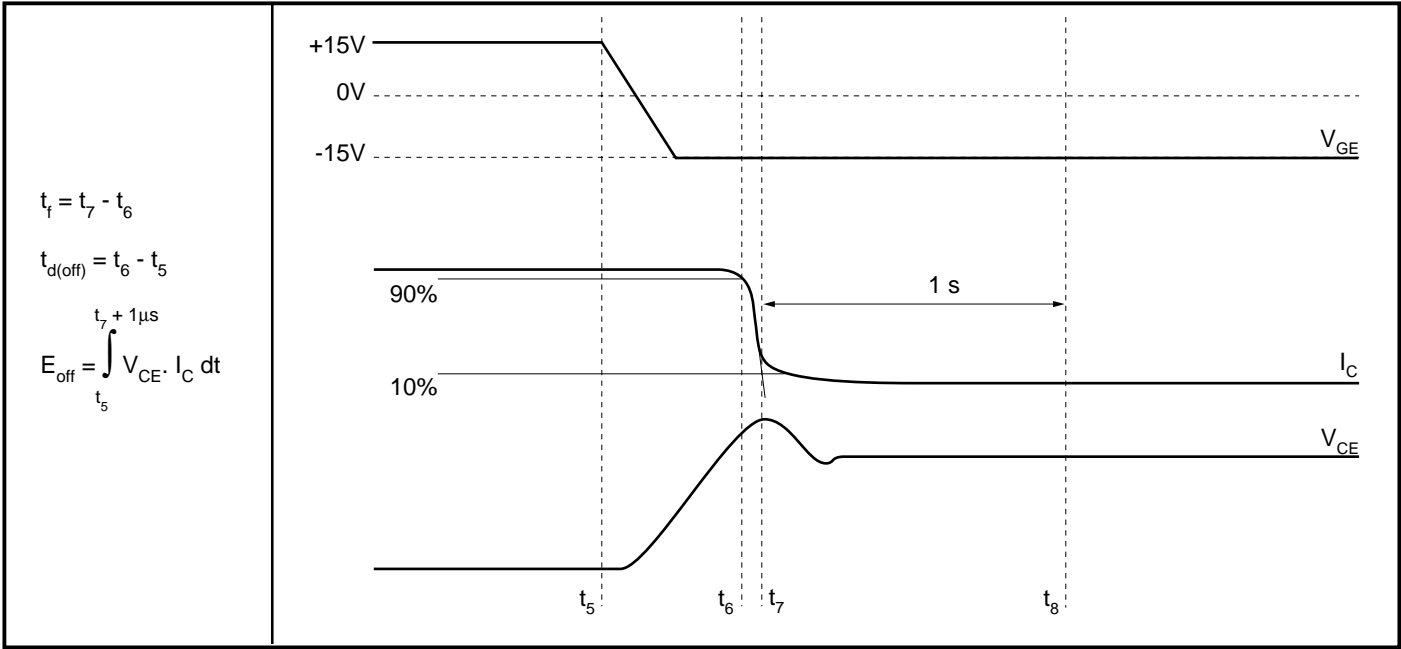


Fig.5 Turn-off characteristics

CURVES

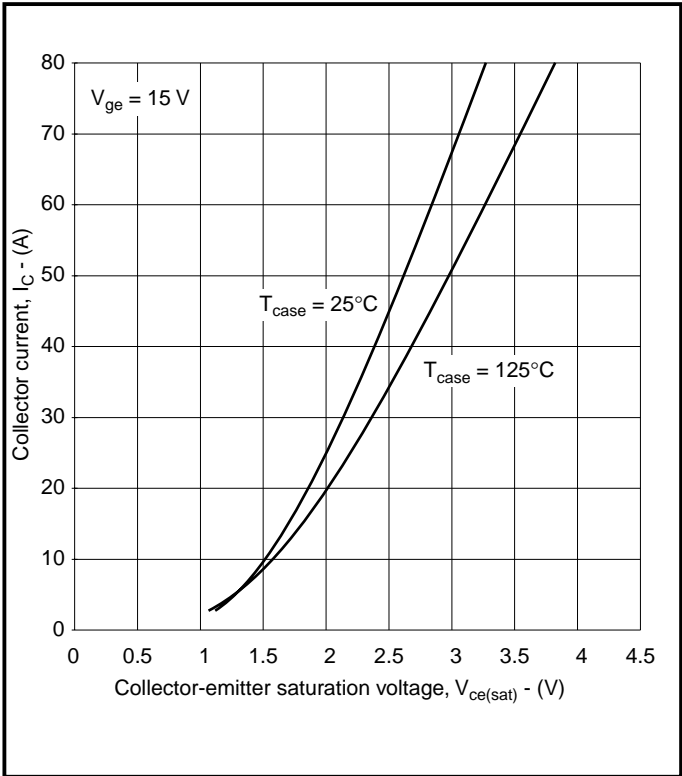


Fig.6 Typical output characteristics

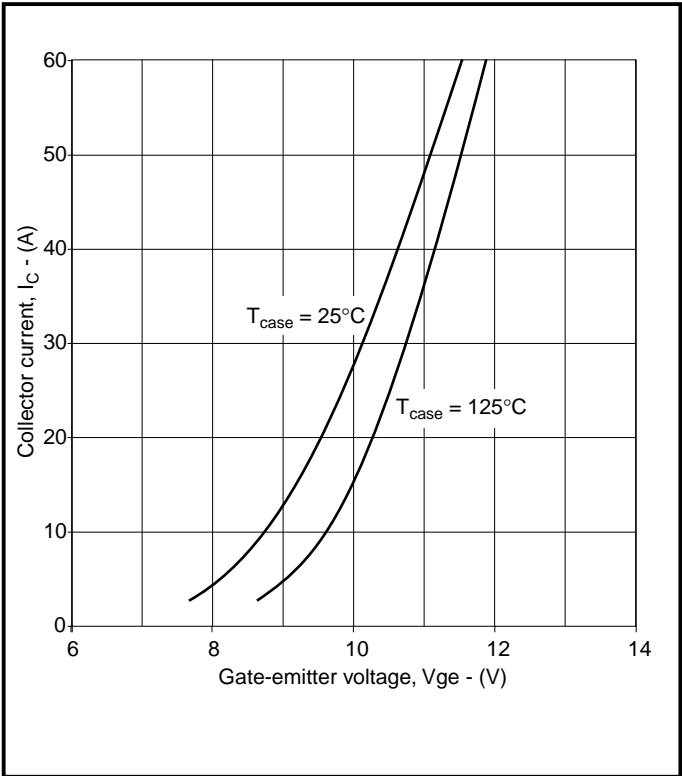
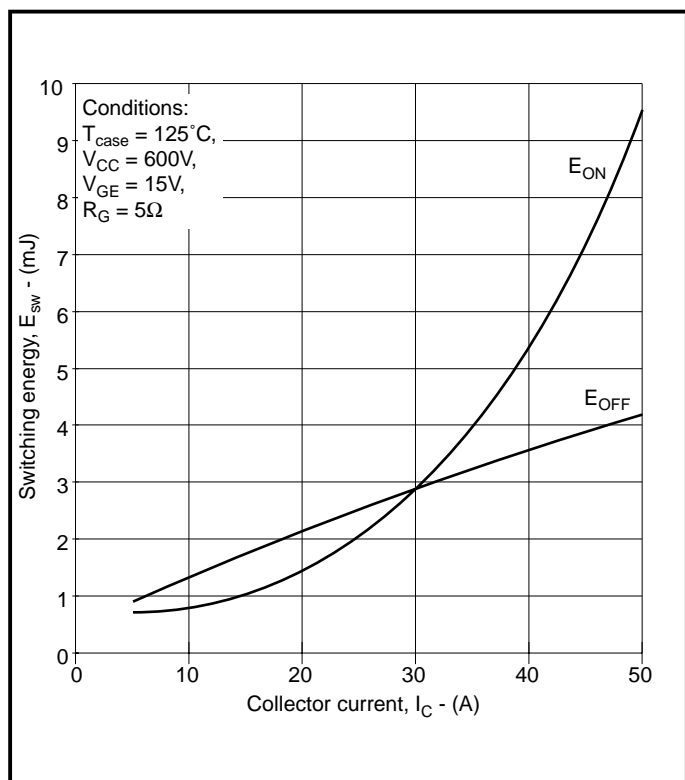
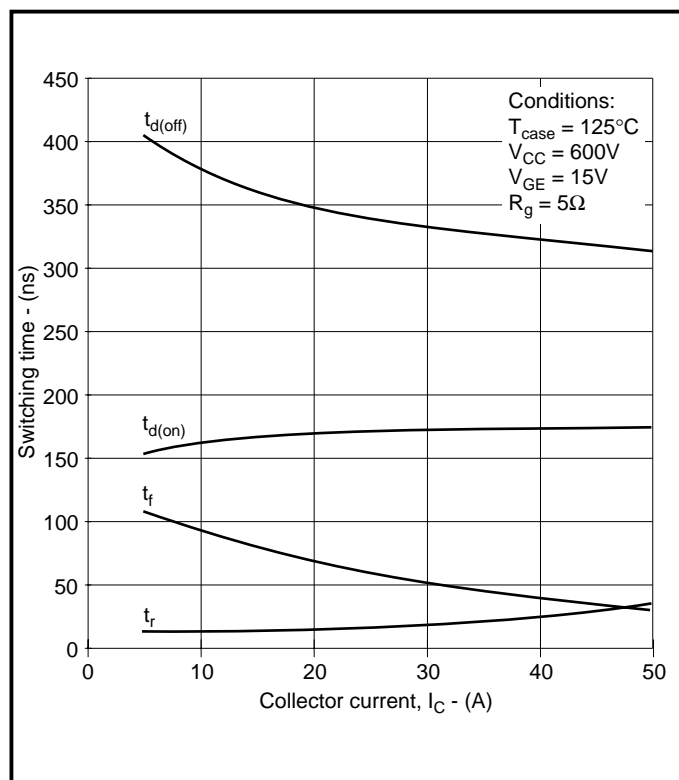
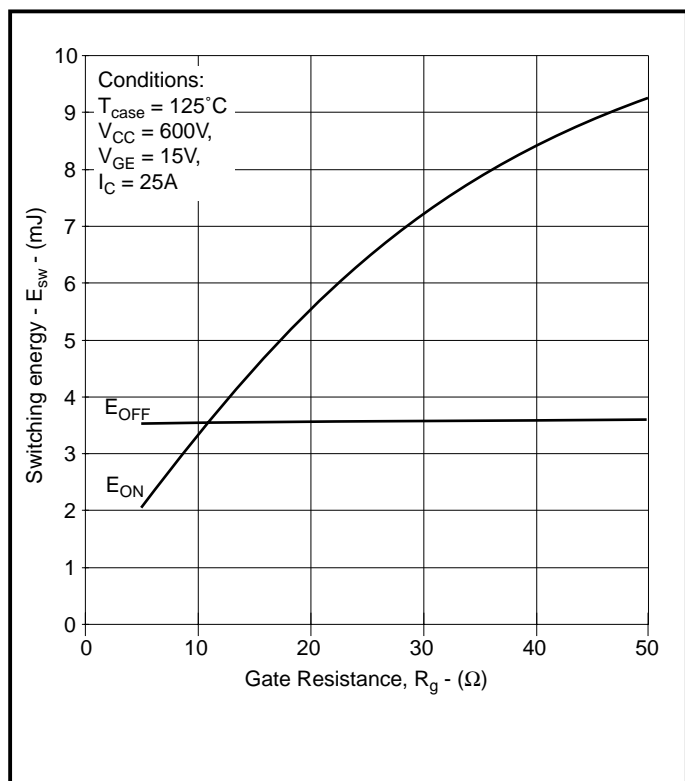
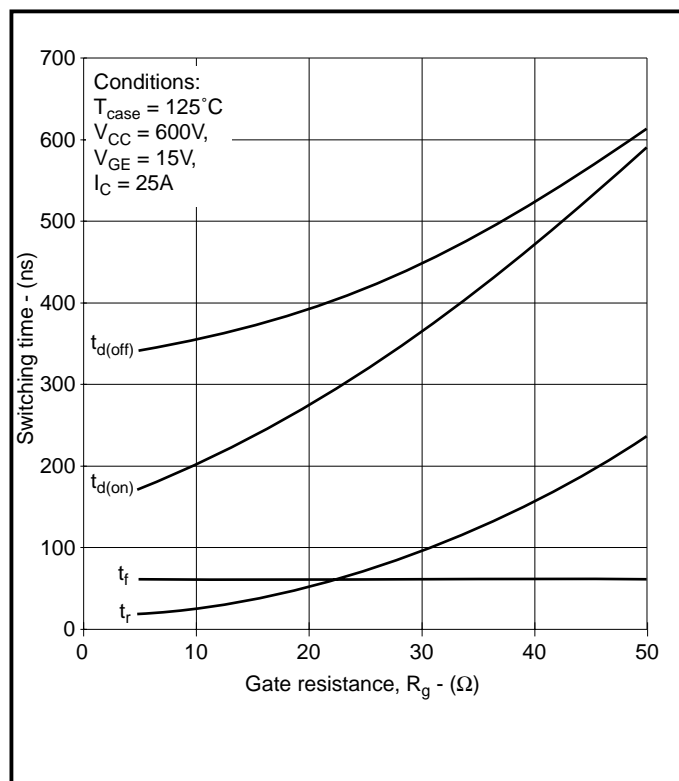
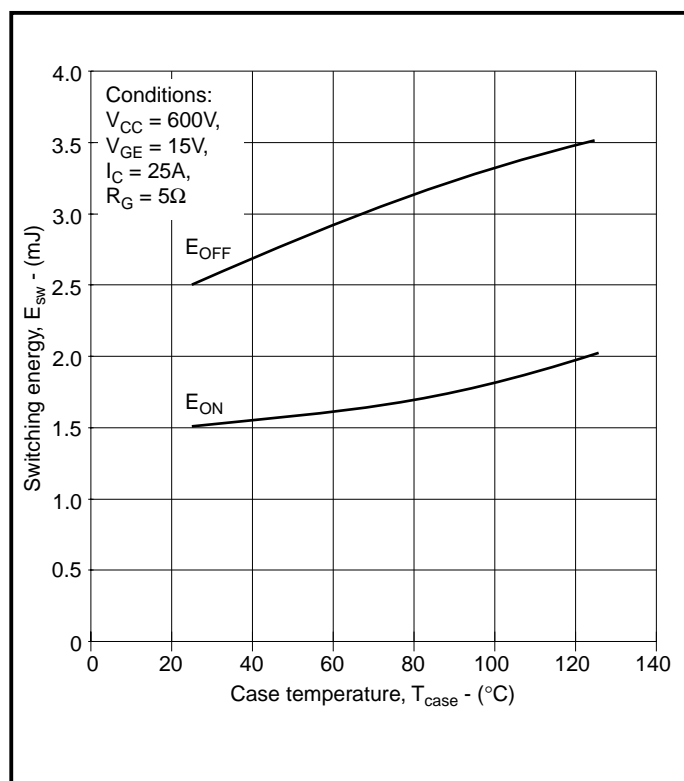
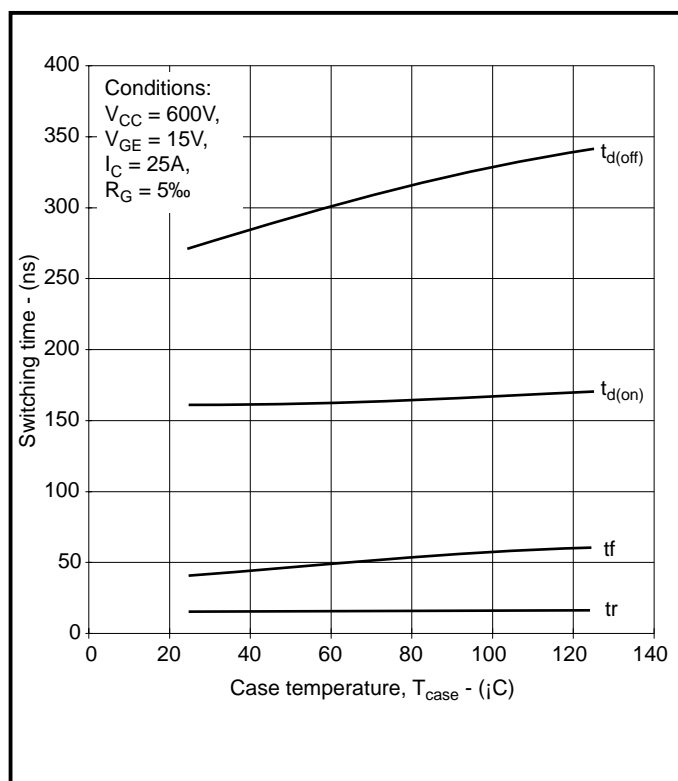


Fig.7 Typical transfer characteristics

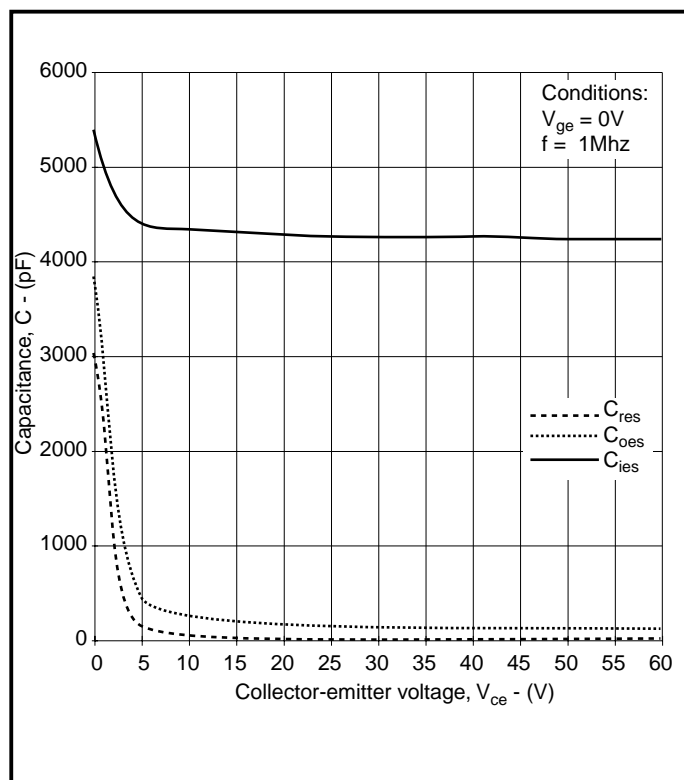

**Fig.8 Typical switching losses vs collector current**

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

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

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



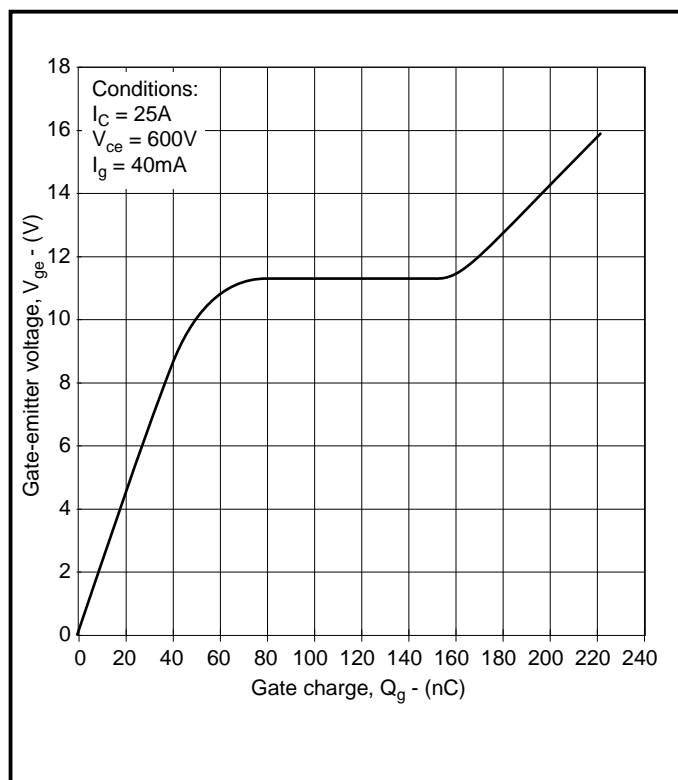
**Fig.12 Typical switching losses vs case temperature**



**Fig.13 Typical switching times vs case temperature**

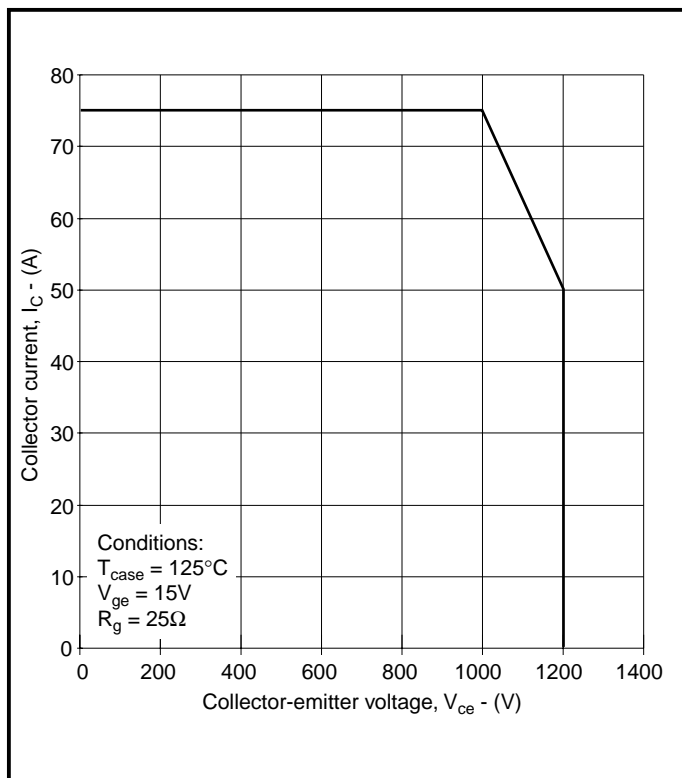


**Fig.14 Typical capacitance**

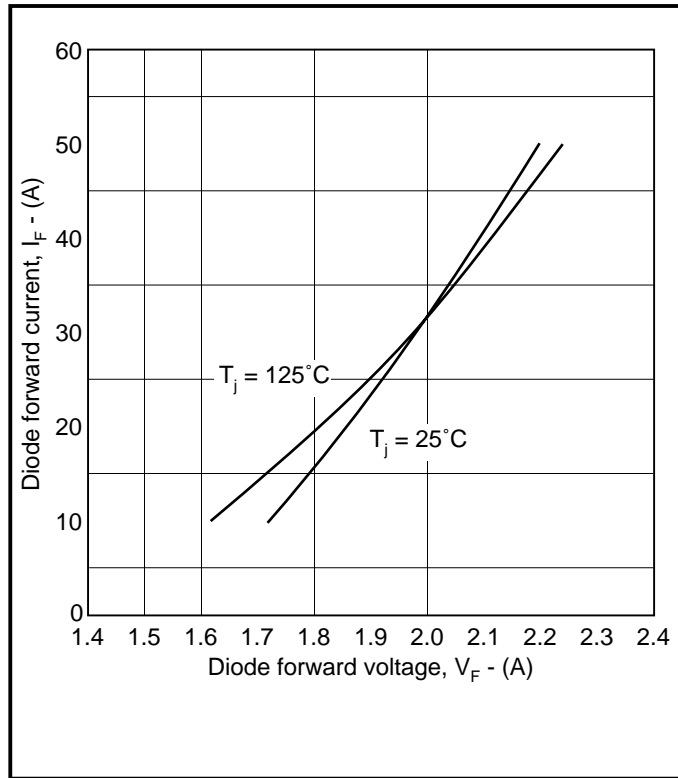


**Fig.15 Typical gate charge**

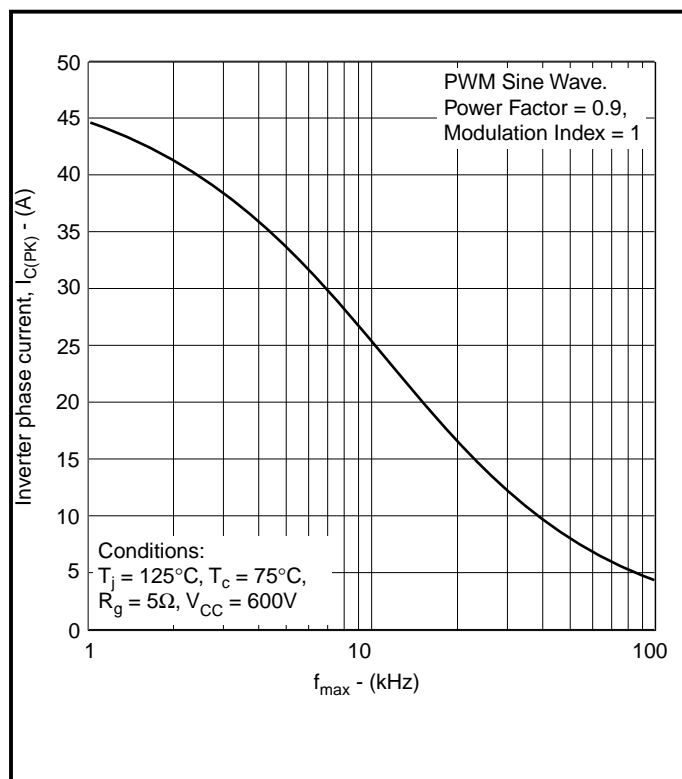




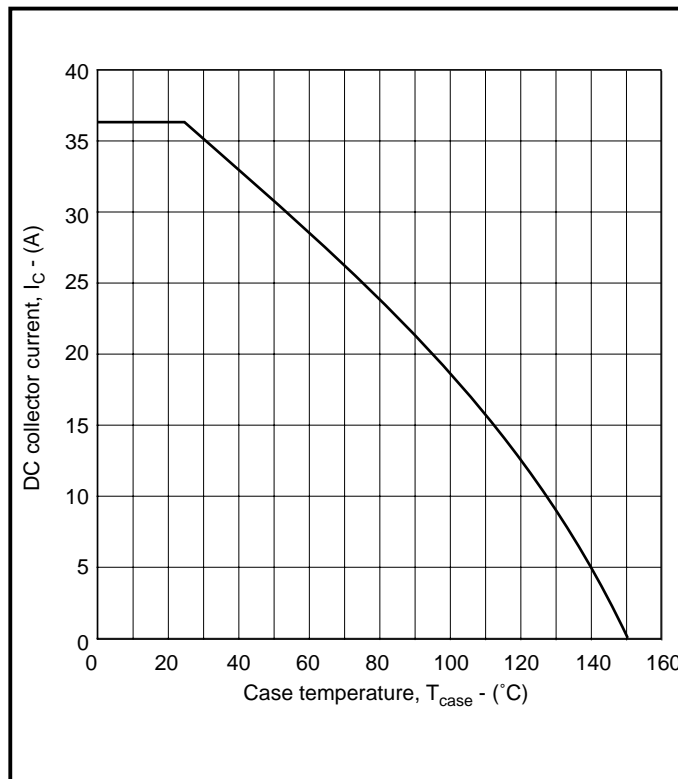
**Fig.16 Reverse bias safe operating area**



**Fig.17 Diode typical forward characteristics**



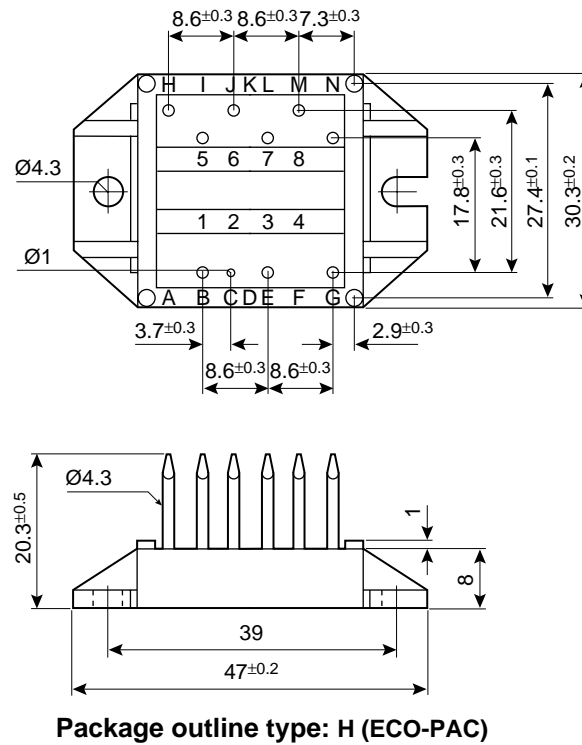
**Fig.18 3-Phase PWM inverter operating frequency**



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

## 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.





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