Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of "Quality Parts,Customers Priority,Honest Operation,and Considerate Service",our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Converter - Brake - Inverter Module
NPT IGBT

Single Phase Rectifier	Brake Chopper	Three Phase Inverter
V_{RRM} = 1600 V	V_{CES} = 600 V	V_{CES} = 600 V
I_{DAVM25} = 65 A	I_{C25} = 29 A	I_{C25} = 29 A
I_{FSM} = 550 A	$V_{CE(sat)}$ = 2.1 V	$V_{CE(sat)}$ = 2.1 V

Part name (Marking on product)

MIAA20WE600TMH

E 72873
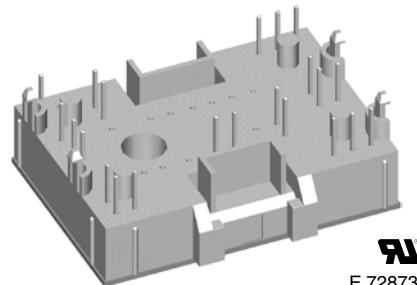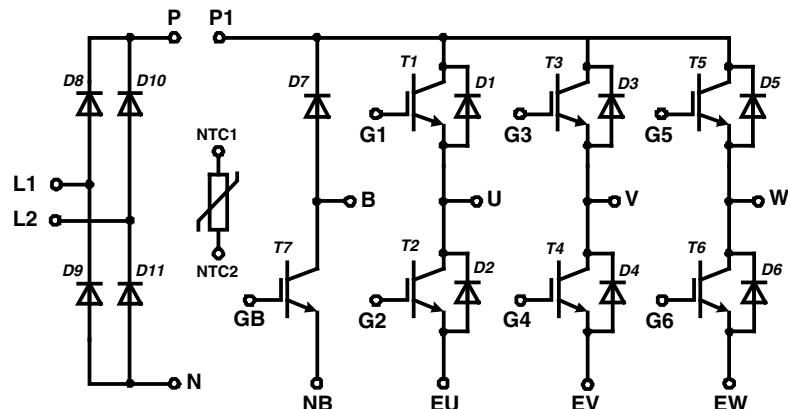
Pin configuration see outlines.

Features:
- High level of integration - only one power semiconductor module required for the whole drive
- Inverter with NPT IGBTs
  - low saturation voltage
  - positive temperature coefficient
  - fast switching
  - short tail current
- Epitaxial free wheeling diodes with hiperfast soft reverse recovery
- Temperature sense included

Application:
- AC motor drives
- Pumps, Fans
- Washing machines
- Air-conditioning system
- Inverter and power supplies

Package:
- "Mini" package
- Assembly height is 17 mm
- Insulated base plate
- Pins suitable for wave soldering and PCB mounting
- Assembly clips available
  - IXKU 5-505 screw clamp
  - IXRB 5-506 click clamp
- UL registered E72873

IXYS reserves the right to change limits, test conditions and dimensions.

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Ouput Inverter T1 - T6

Symbol	Definitions	Conditions		min.	typ.	max.	Unit
					Ratings		
V_{CES}	collector emitter voltage		$T_{VJ} = 150°C$			600	V
V_{GES}	max. DC gate voltage	continuous				±20	V
V_{GEM}	max. transient collector gate voltage	transient				±30	V
I_{C25}	collector current		$T_C = 25°C$			29	A
I_{C80}			$T_C = 80°C$			20	A
P_{tot}	total power dissipation		$T_C = 25°C$			100	W
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 20 A$; $V_{GE} = 15 V$	$T_{VJ} = 25°C$		2.1	2.7	V
			$T_{VJ} = 125°C$		2.4		V
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 0.5 A$; $V_{GE} = V_{CE}$	$T_{VJ} = 25°C$	4.5	5.5	6.5	V
I_{CES}	collector emitter leakage current	$V_{CE} = V_{CES}$; $V_{GE} = 0 V$	$T_{VJ} = 25°C$			1.1	mA
			$T_{VJ} = 125°C$		1.3		mA
I_{GES}	gate emitter leakage current	$V_{GE} = ±20 V$				150	nA
C_{ies}	input capacitance	$V_{CE} = 25 V$; $V_{GE} = 0 V$; $f = 1 MHz$			900		pF
$Q_{G(on)}$	total gate charge	$V_{CE} = 300 V$; $V_{GE} = 15 V$; $I_C = 20 A$			76		nC
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 300 V$; $I_C = 20 A$ $V_{GE} = ±15 V$; $R_G = 47 Ω$	$T_{VJ} = 25°C$		35		ns
t_r	current rise time				45		ns
$t_{d(off)}$	turn-off delay time				155		ns
t_f	current fall time				75		ns
E_{on}	turn-on energy per pulse				0.39		mJ
E_{off}	turn-off energy per pulse				0.4		mJ
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 300 V$; $I_C = 20 A$ $V_{GE} = ±15 V$; $R_G = 47 Ω$	$T_{VJ} = 125°C$		35		ns
t_r	current rise time				45		ns
$t_{d(off)}$	turn-off delay time				165		ns
t_f	current fall time				150		ns
E_{on}	turn-on energy per pulse				0.6		mJ
E_{off}	turn-off energy per pulse				0.54		mJ
RBSOA	reverse bias safe operating area	$V_{GE} = ±15 V$; $R_G = 47 Ω$; $I_C = 40 A$ $T_{VJ} = 125°C$		$V_{CEK} ≤ V_{CES}-L_S·d_I/dt$			V
I_{SC} **(SCSOA)**	short circuit safe operating area	$V_{CE} = 360 V$; $V_{GE} = ±15 V$; $R_G = 47 Ω$; $t_p = 10 μs$; non-repetitive	$T_{VJ} = 125°C$		90		A
R_{thJC}	thermal resistance junction to case	(per IGBT)				1.3	K/W
R_{thCH}	thermal resistance case to heatsink				0.45		K/W

Output Inverter D1 - D6

Symbol	Definitions	Conditions		min.	typ.	max.	Unit
					Ratings		
V_{RRM}	max. repetitve reverse voltage		$T_{VJ} = 150°C$			600	V
I_{F25}	forward current		$T_C = 25°C$			37	A
I_{F80}			$T_C = 80°C$			24	A
V_F	forward voltage	$I_F = 20 A$; $V_{GE} = 0 V$	$T_{VJ} = 25°C$		1.95	2.2	V
			$T_{VJ} = 125°C$		1.65		V
Q_{rr}	reverse recovery charge	$V_R = 300 V$ $di_F/dt = -370 A/μs$ $I_F = 20 A$; $V_{GE} = 0 V$	$T_{VJ} = 125°C$		0.58		μC
I_{RM}	max. reverse recovery current				10.7		A
t_{rr}	reverse recovery time				110		ns
E_{rec}	reverse recovery energy				60		μJ
R_{thJC}	thermal resistance junction to case	(per diode)				1.6	K/W
R_{thCH}	thermal resistance case to heatsink				0.55		K/W

$T_C = 25°C$ unless otherwise stated

IXYS reserves the right to change limits, test conditions and dimensions.

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Brake T7

Symbol	Definitions	Conditions		min.	typ.	max.	Unit
					Ratings		
V_{CES}	collector emitter voltage		$T_{VJ} = 150°C$			600	V
V_{GES}	max. DC gate voltage	continuous				±20	V
V_{GEM}	max. transient collector gate voltage	transient				±30	V
I_{C25}	collector current		$T_C = 25°C$			29	A
I_{C80}			$T_C = 80°C$			20	A
P_{tot}	total power dissipation		$T_C = 25°C$			100	W
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 20$ A; $V_{GE} = 15$ V	$T_{VJ} = 25°C$		2.1	2.7	V
			$T_{VJ} = 125°C$		2.4		V
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 0.5$ A; $V_{GE} = V_{CE}$	$T_{VJ} = 25°C$	4.5	5.5	6.5	V
I_{CES}	collector emitter leakage current	$V_{CE} = V_{CES}$; $V_{GE} = 0$ V	$T_{VJ} = 25°C$			1.0	mA
			$T_{VJ} = 125°C$		0.8		mA
I_{GES}	gate emitter leakage current	$V_{GE} = ±20$ V				150	nA
C_{ies}	input capacitance	$V_{CE} = 25$ V; $V_{GE} = 0$ V; $f = 1$ MHz			900		pF
$Q_{G(on)}$	total gate charge	$V_{CE} = 300$ V; $V_{GE} = 15$ V; $I_C = 20$ A			76		nC
$t_{d(on)}$	turn-on delay time				35		ns
t_r	current rise time	inductive load	$T_{VJ} = 25°C$		45		ns
$t_{d(off)}$	turn-off delay time	$V_{CE} = 300$ V; $I_C = 20$ A			155		ns
t_f	current fall time	$V_{GE} = ±15$ V; $R_G = 47\ \Omega$			75		ns
E_{on}	turn-on energy per pulse				0.39		mJ
E_{off}	turn-off energy per pulse				0.4		mJ
$t_{d(on)}$	turn-on delay time				35		ns
t_r	current rise time	inductive load	$T_{VJ} = 125°C$		45		ns
$t_{d(off)}$	turn-off delay time	$V_{CE} = 300$ V; $I_C = 20$ A			165		ns
t_f	current fall time	$V_{GE} = ±15$ V; $R_G = 47\ \Omega$			150		ns
E_{on}	turn-on energy per pulse				0.6		mJ
E_{off}	turn-off energy per pulse				0.54		mJ
RBSOA	reverse bias safe operating area	$V_{GE} = ±15$ V; $R_G = 47\ \Omega$; $I_C = 40$ A $\quad T_{VJ} = 125°C$		$V_{CEK} \leq V_{CES}\text{-}L_S·d_I/dt$			V
I_{SC} **(SCSOA)**	short circuit safe operating area	$V_{CE} = 360$ V; $V_{GE} = ±15$ V; $\quad T_{VJ} = 125°C$ $R_G = 47\ \Omega$; $t_p = 10$ µs; non-repetitive			90		A
R_{thJC}	thermal resistance junction to case	(per IGBT)				1.3	K/W
R_{thCH}	thermal resistance case to heatsink				0.45		K/W

Brake Chopper D7

Symbol	Definitions	Conditions		min.	typ.	max.	Unit
					Ratings		
V_{RRM}	max. repetitive reverse voltage		$T_{VJ} = 150°C$			600	V
I_{F25}	forward current		$T_C = 25°C$			37	A
I_{F80}			$T_C = 80°C$			24	A
V_F	forward voltage	$I_F = 20$ A; $V_{GE} = 0$ V	$T_{VJ} = 25°C$		1.95	2.2	V
			$T_{VJ} = 125°C$		1.65		V
I_R	reverse current	$V_R = V_{RRM}$	$T_{VJ} = 25°C$			0.1	mA
			$T_{VJ} = 125°C$		0.4		mA
Q_{rr}	reverse recovery charge	$V_R = 300$ V			0.58		µC
I_{RM}	max. reverse recovery current	$di_F/dt = -370$ A/µs $\quad T_{VJ} = 125°C$			10.7		A
t_{rr}	reverse recovery time	$I_F = 20$ A; $V_{GE} = 0$ V			110		ns
E_{rec}	reverse recovery energy				60		µJ
R_{thJC}	thermal resistance junction to case	(per diode)				1.6	K/W
R_{thCH}	thermal resistance case to heatsink				0.55		K/W

$T_C = 25°C$ unless otherwise stated

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Input Rectifier Bridge D8 - D11

| Symbol	Definitions	Conditions		min.	typ.	max.	Unit
V_{RRM}	max. repetitive reverse voltage		$T_{VJ} = 25°C$			1600	V
I_{FAV}	average forward current	sine 180°	$T_C = 80°C$			39	A
I_{DAVM}	max. average DC output current	rect.; d = ½	$T_C = 80°C$			42	A
I_{FSM}	max. forward surge current	t = 10 ms; sine 50 Hz	$T_{VJ} = 25°C$			550	A
			$T_{VJ} = 125°C$			tbd	A
I^2t	I²t value for fusing	t = 10 ms; sine 50 Hz	$T_{VJ} = 25°C$			1270	A²s
			$T_{VJ} = 125°C$			tbd	A²s
P_{tot}	total power dissipation		$T_C = 25°C$			100	W
V_F	forward voltage	I_F = 30 A	$T_{VJ} = 25°C$		1.2	1.5	V
			$T_{VJ} = 125°C$		1.3		V
I_R	reverse current	$V_R = V_{RRM}$	$T_{VJ} = 25°C$			0.03	mA
			$T_{VJ} = 125°C$		0.3		mA
R_{thJC}	thermal resistance junction to case	(per diode)				1.2	K/W
R_{thCH}	thermal resistance case to heatsink	(per diode)			0.4		K/W

Temperature Sensor NTC

Symbol	Definitions	Conditions		min.	typ.	max.	Unit
R_{25}	resistance		$T_C = 25°C$	4.75	5.0	5.25	kΩ
$B_{25/50}$					3375		K

Module

Symbol	Definitions	Conditions	min.	typ.	max.	Unit
T_{VJ}	operating temperature		-40		125	°C
T_{VJM}	max. virtual junction temperature				150	°C
T_{stg}	storage temperature		-40		125	°C
V_{ISOL}	isolation voltage	I_{ISOL} ≤ 1 mA; 50/60 Hz			2500	V~
CTI	comparative tracking index			-		
F_C	mounting force		40		80	N
d_S	creep distance on surface		12.7			mm
d_A	strike distance through air		12			mm
Weight				35		g

Equivalent Circuits for Simulation
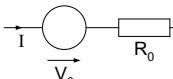
Symbol	Definitions	Conditions		min.	typ.	max.	Unit
V_0	rectifier diode	D8 - D11	$T_{VJ} = 125°C$		0.9		V
R_0					6		mΩ
V_0	IGBT	T1 - T6	$T_{VJ} = 125°C$		1.1		V
R_0					40		mΩ
V_0	free wheeling diode	D1 - D6	$T_{VJ} = 125°C$		1.25		V
R_0					12		mΩ
V_0	IGBT	T7	$T_{VJ} = 125°C$		1.1		V
R_0					60		mΩ
V_0	free wheeling diode	D7	$T_{VJ} = 125°C$		1.25		V
R_0					25		mΩ

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$T_C = 25°C$ unless otherwise stated

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Circuit Diagram
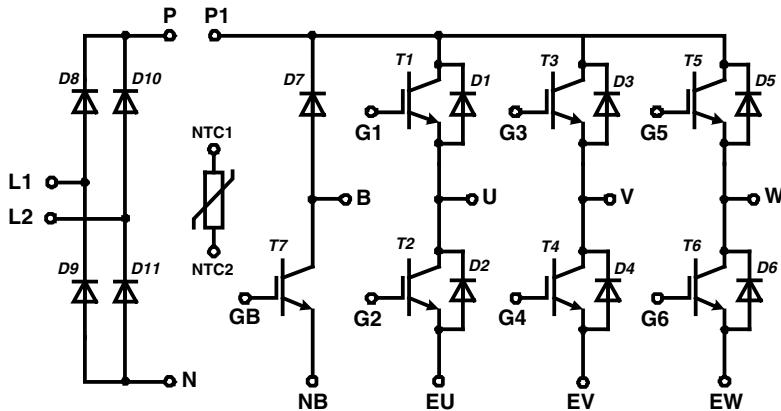
## Outline Drawing

Dimensions in mm (1 mm = 0.0394")

A (2:1)

Pin positions with tolerance ⊕ Ø 0.4
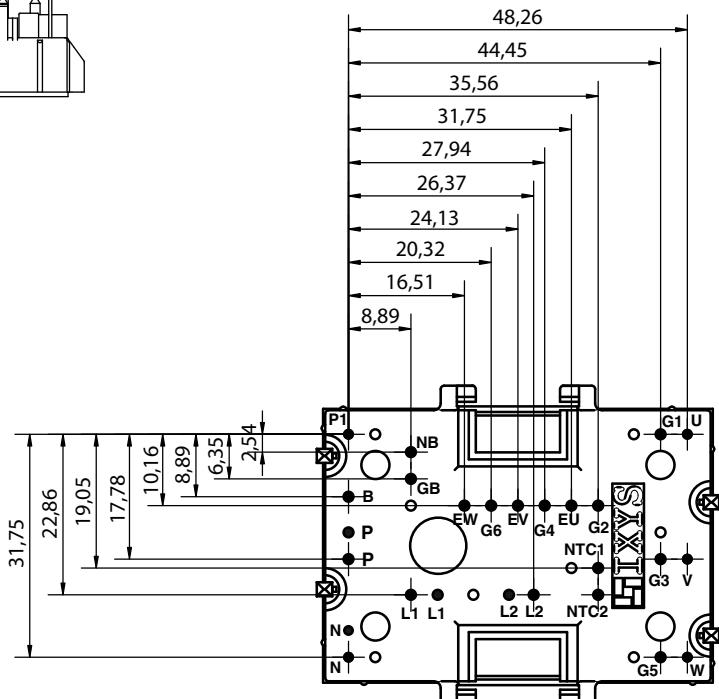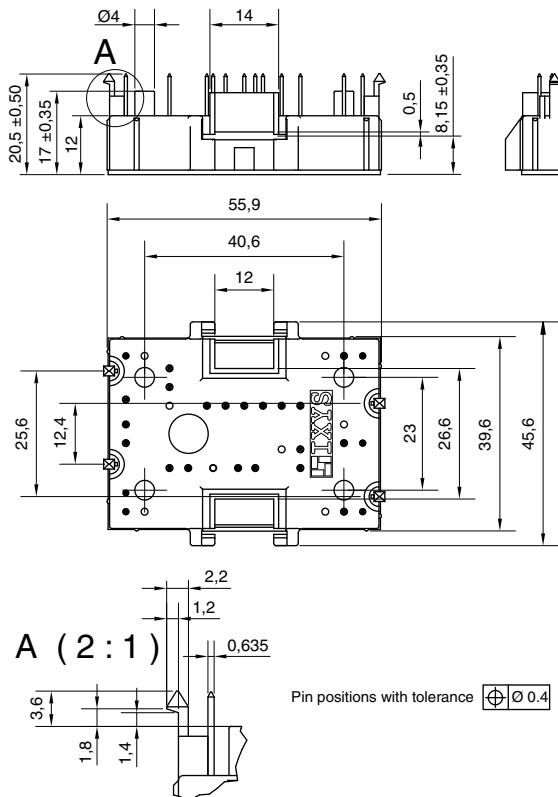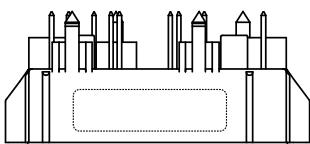
Product Marking

**Part number**

M = Module
I = IGBT
A = IGBT (NPT)
A = Gen 1 / std
20 = Current Rating [A]
WE = 6-Pack + 1~ Rectifier Bridge & Brake Unit
600 = Reverse Voltage [V]
T = NTC
MH = MiniPack2

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MIAA 20 WE 600 TMH	MIAA20WE600TMH	Box	20	504708

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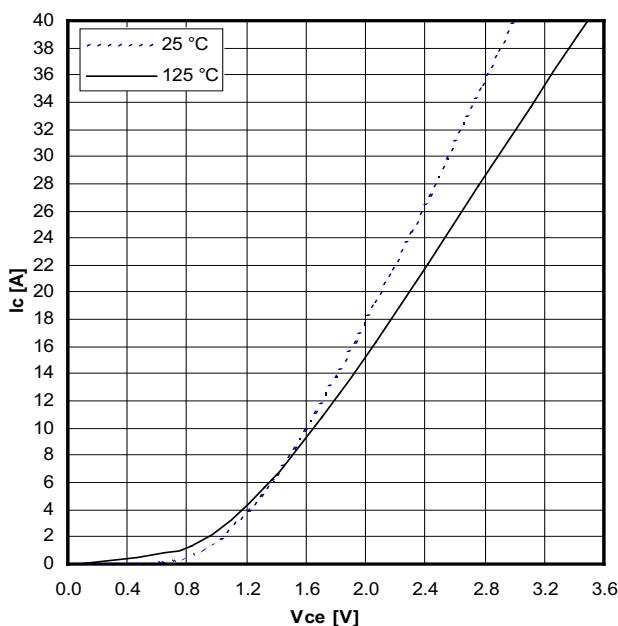
Typical output characteristics, V_{GE} = 15 V
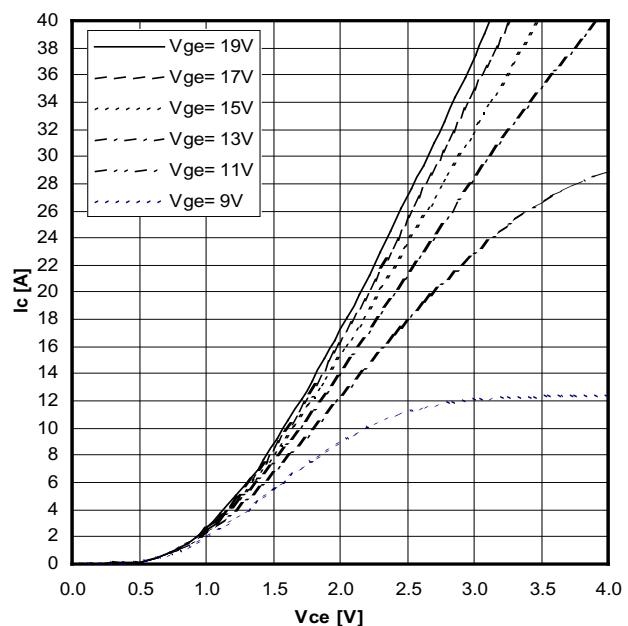
Typical output characteristics (125°C)
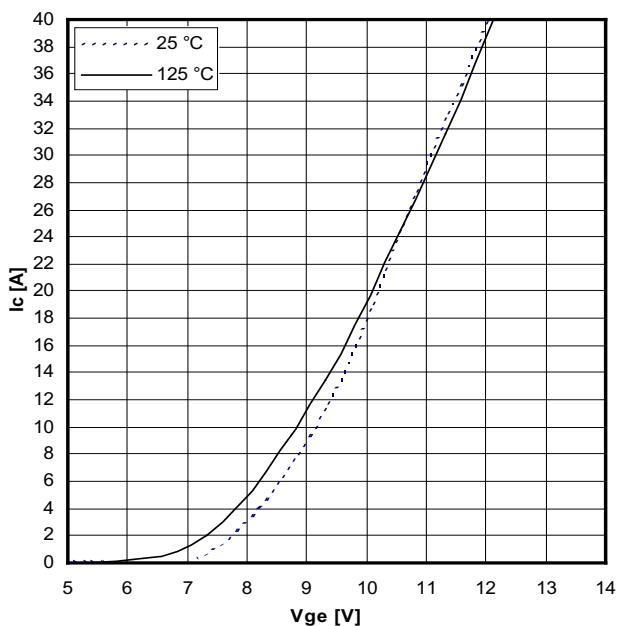
Typical transfer characteristics

Typical forward characteristics of freewheeling diode

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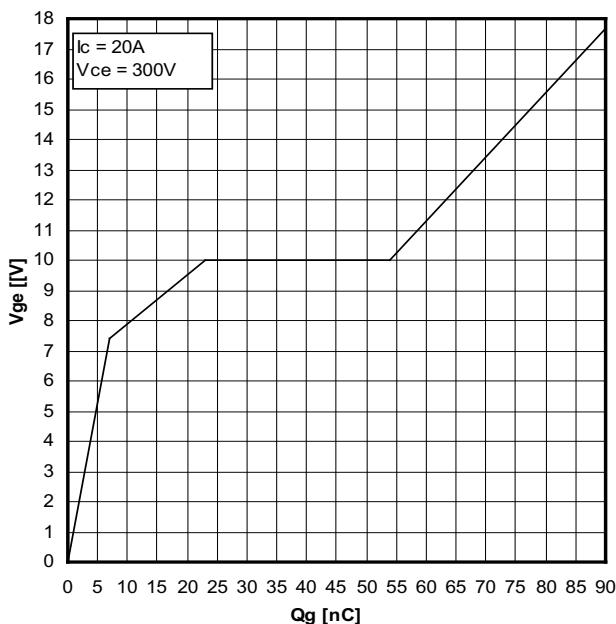
Typical turn on gate charge
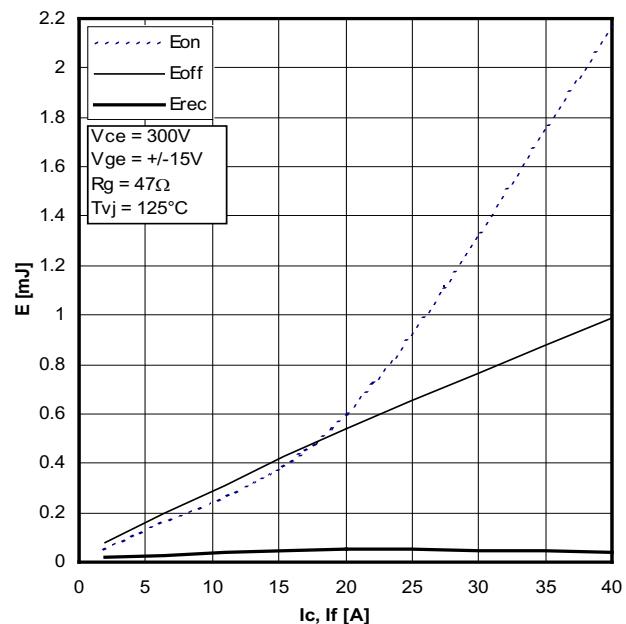
Typical switching energy versus collector current
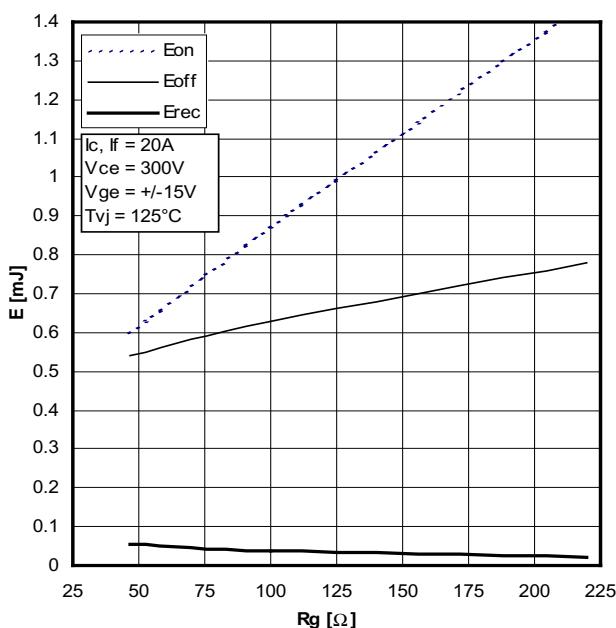

Typical switching energy versus gate resistance

Typical turn-off characteristics of free wheeling diode

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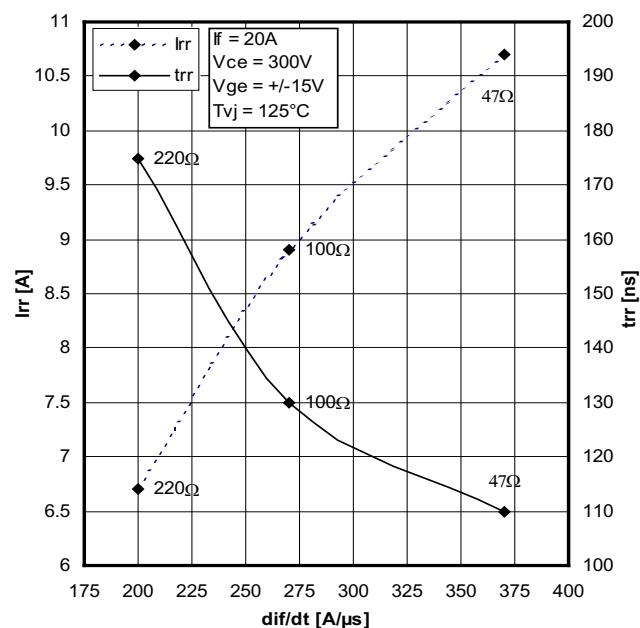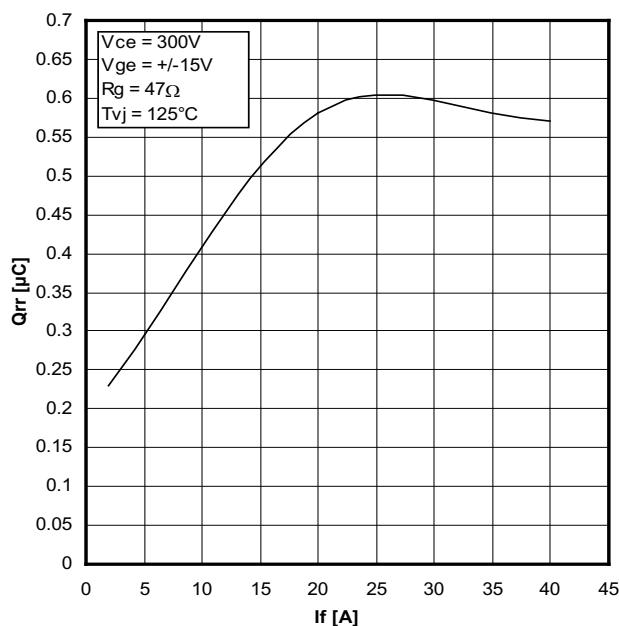
Typical turn-off characteristics of free wheeling diode
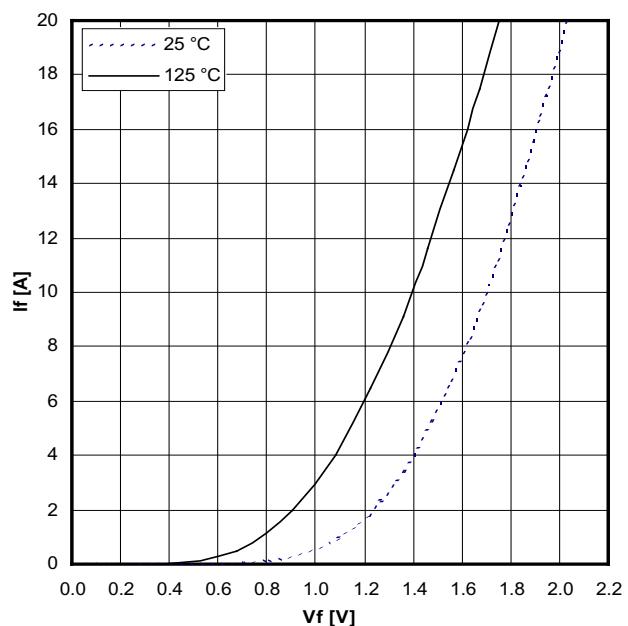
Typical forward characteristics of brake diode
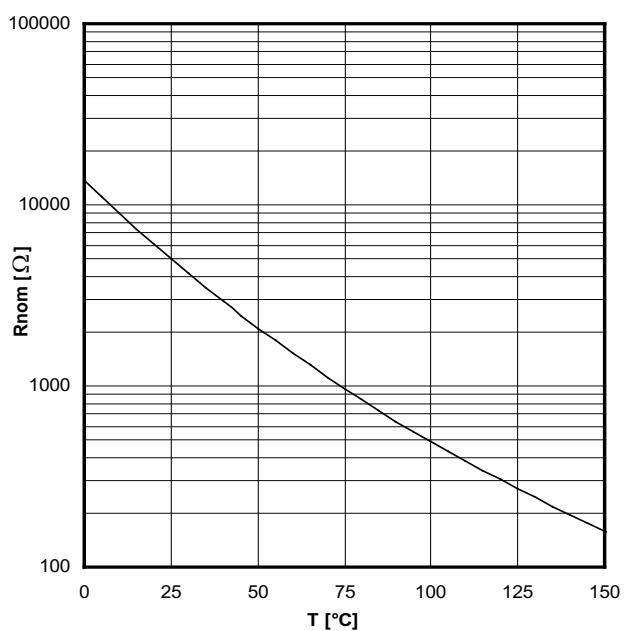
Typical thermistor resistance versus temperature

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