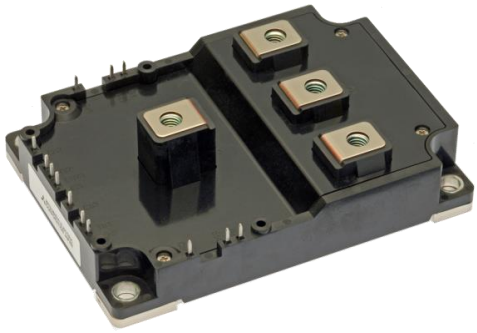
MITSUBISHI ELECTRIC

<IGBT Modules>

CM200ST-24T

HIGH POWER SWITCHING USE
INSULATED TYPE



fourpack (BRIDGE & AC SWITCH)

Collector current I_C ..... 200 A
Collector-emitter voltage V_{CES} .....
BRIDGE 1200 V
AC SWITCH 650 V
Maximum junction temperature T_{vjmax} ..... 175 °C

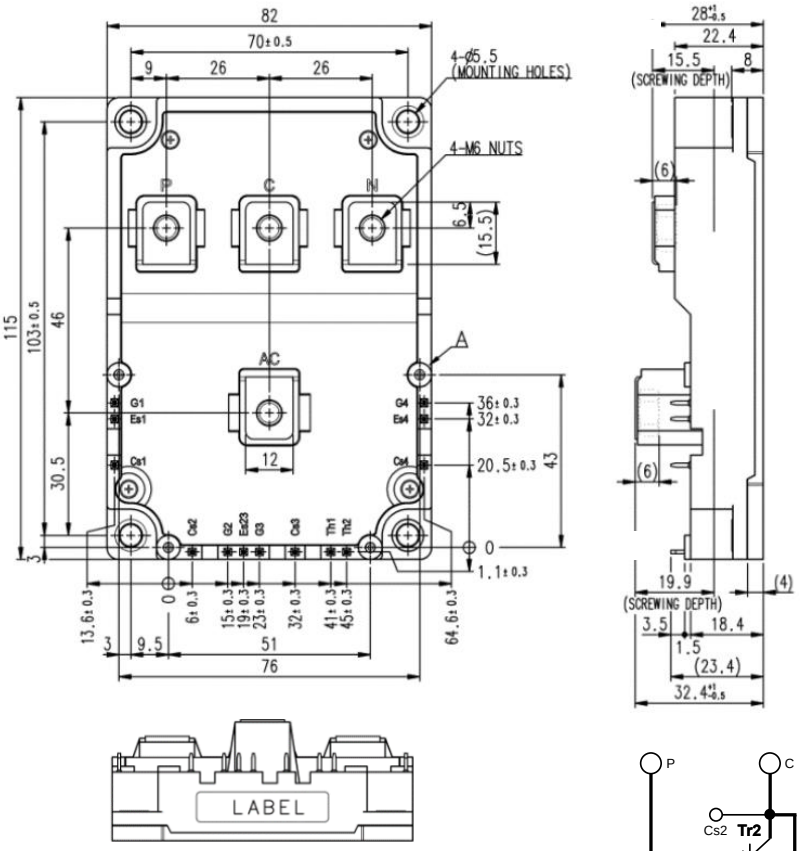
- ●Flat base Type
- ●Copper base plate
- ●Tin plating pin terminals
- ●RoHS Directive compliant*
- ●Recognized under UL1557, File E323585

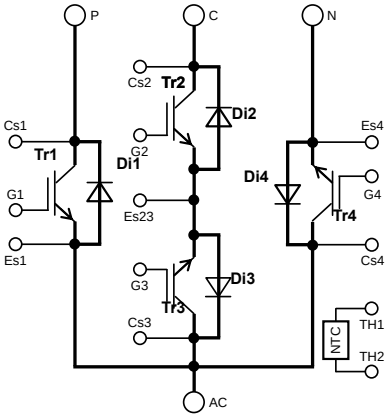
APPLICATION

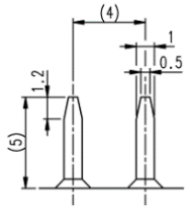
3level inverter, UPS, PV

OUTLINE DRAWING & INTERNAL CONNECTION

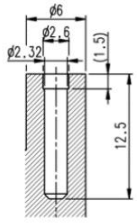
Dimension in mm







TERMINAL t=0.8



SECTION A

Tolerance otherwise specified

Division of Dimension		Tolerance
0.5	to 3	±0.2
over 3	to 6	±0.3
over 6	to 30	±0.5
over 30	to 120	±0.8
over 120	to 400	±1.2

BRIDGE
- IGBT : Tr1, Tr4
- DIODE : Di1, Di4

AC SWITCH
- IGBT : Tr2, Tr3
- DIODE : Di2, Di3

<IGBT Modules>

CM200ST-24T

HIGH POWER SWITCHING USE
INSULATED TYPE

MAXIMUM RATINGS (T_{vj}=25 °C, unless otherwise specified)

BRIDGE PART IGBT/DIODE (Tr1, Tr4, Di1, Di4)

Symbol	Item	Conditions	Rating	Unit
V_{CES}	Collector-emitter voltage	G-E short-circuited	1200	V
V_{GES}	Gate-emitter voltage	C-E short-circuited	±20	V
I_C	Collector current	DC, T_C=108 °C (Note2, 4)	200	A
I_{CRM}		Pulse, Repetitive, V_{GE}=15 V (Note3)	400	
P_{tot}	Total power dissipation	T_C=25 °C (Note2, 4)	1020	W
I_E (Note1)	Emitter current	DC (Note2)	200	A
I_{ERM} (Note1)		Pulse, Repetitive (Note3)	400	

AC SWITCH PART IGBT/DIODE (Tr2, Tr3, Di2, Di3)

Symbol	Item	Conditions	Rating	Unit
V_{CES}	Collector-emitter voltage	G-E short-circuited	650	V
V_{GES}	Gate-emitter voltage	C-E short-circuited	±20	V
I_C	Collector current	DC, T_C=95°C (Note2, 4)	200	A
I_{CRM}		Pulse, Repetitive, V_{GE}=15 V (Note3)	400	
P_{tot}	Total power dissipation	T_C=25 °C (Note2, 4)	697	W
I_E (Note1)	Emitter current	DC (Note2)	200	A
I_{ERM} (Note1)		Pulse, Repetitive (Note3)	400	

MODULE

Symbol	Item	Conditions	Rating	Unit
V_{isol}	Isolation voltage	Terminals to base plate, RMS, f=60 Hz, AC 1 min	4000	V
T_{vjmax}	Maximum junction temperature	Instantaneous event (overload) (Note9)	175	°C
T_{Cmax}	Maximum case temperature	(Note4, 9)	125	
T_{vjop}	Operating junction temperature	Continuous operation (under switching) (Note9)	-40 ~ 150	°C
T_{stg}	Storage temperature	-	-40 ~ 125	

ELECTRICAL CHARACTERISTICS (T_{vj}=25 °C, unless otherwise specified)

BRIDGE PART IGBT/DIODE (Tr1, Tr4, Di1, Di4)

Symbol	Item	Conditions		Limits			Unit
				Min.	Typ.	Max.	
I_{CES}	Collector-emitter cut-off current	V_{CE}=V_{CES}, G-E short-circuited		-	-	1	mA
I_{GES}	Gate-emitter leakage current	V_{GE}=V_{GES}, C-E short-circuited		-	-	0.5	μA
$V_{GE(th)}$	Gate-emitter threshold voltage	I_C=20mA, V_{CE}=10 V		5.4	6.0	6.6	V
V_{CEsat} (Terminal)	Collector-emitter saturation voltage	I_C=200 A, V_{GE}=15 V, Auxiliary Terminal (Note5)	T_{vj}=25 °C	-	1.60	1.95	V
			T_{vj}=125 °C	-	1.85	-	
			T_{vj}=150 °C	-	1.90	-	
V_{CEsat} (Chip)		I_C=200 A, V_{GE}=15 V, Chip (Note5)	T_{vj}=25 °C	-	1.50	1.75	V
			T_{vj}=125 °C	-	1.70	-	
			T_{vj}=150 °C	-	1.75	-	
C_{ies}	Input capacitance	V_{CE}=10 V, G-E short-circuited		-	-	48.5	nF
C_{oes}	Output capacitance			-	-	1.4	
C_{res}	Reverse transfer capacitance			-	-	0.6	
Q_G	Gate charge	$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, I_C=200A, V_{GE}=15 V		-	1.5	-	μC
$t_{d(on)}$	Turn-on delay time	$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, I_C=200 A, V_{GE}=±15 V, R_G=3.3 Ω, Inductive load		-	-	750	ns
t_r	Rise time			-	-	200	
$t_{d(off)}$	Turn-off delay time			-	-	850	
t_f	Fall time			-	-	200	
V_{EC} (Note1) (Terminal)	Emitter-collector voltage	I_E=200 A, G-E short-circuited, Auxiliary Terminal (Note5)	T_{vj}=25 °C	-	1.70	2.15	V
			T_{vj}=125 °C	-	1.75	-	
			T_{vj}=150 °C	-	1.75	-	
V_{EC} (Note1) (Chip)		I_E=200 A, G-E short-circuited, Chip (Note5)	T_{vj}=25 °C	-	1.60	1.95	V
			T_{vj}=125 °C	-	1.60	-	
			T_{vj}=150 °C	-	1.60	-	

ELECTRICAL CHARACTERISTICS (Cont; T_{vj}=25 °C, unless otherwise specified)

BRIDGE PART IGBT/DIODE (Tr1, Tr4, Di1, Di4)

Symbol	Item	Conditions		Limits			Unit
				Min.	Typ.	Max.	
t_{rr} (Note1)	Reverse recovery time	$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, I_E=200 A, V_{GE}=±15 V,		-	-	350	ns
Q_{rr} (Note1)	Reverse recovery charge	R_G=0 Ω(Tr2/Tr3), Inductive load		-	19.0	-	μC
E_{on}	Turn-on switching energy per pulse	$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, I_C=I_E=200 A,	R_G(Tr1,4) =3.3 Ω	-	10.3	-	mJ
E_{off}	Turn-off switching energy per pulse	V_{GE}=±15 V, T_{vj}=150 °C,		-	11.3	-	
E_{rr} (Note1)	Reverse recovery energy per pulse	Inductive load	R_G(Tr2,3) =0 Ω	-	6.3	-	mJ
$R_{CC'+EE'}$	Internal lead resistance	Main terminals-chip, per switch, T_C=25 °C (Note4)		-	0.5	-	mΩ
r_g	Internal gate resistance	Per switch		-	2.0	-	Ω

RECOMMENDED OPERATING CONDITIONS

Symbol	Item	Conditions		Limits			Unit
				Min.	Typ.	Max.	
$V_{CC(P-C)}$ / $V_{CC(C-N)}$	(DC) Supply voltage	Applied across each of P to C and C to N		-	300	425	V
V_{GEon}	Gate (-emitter drive) voltage	Applied across emitter to gate of each IGBT		13.5	15.0	16.5	V
R_G	External gate resistance	Per switch	Tr1, Tr4	3.3	-	33	Ω

AC SWITCH PART IGBT/DIODE (Tr2, Tr3, Di2, Di3)

Symbol	Item	Conditions		Limits			Unit
				Min.	Typ.	Max.	
I_{CES}	Collector-emitter cut-off current	V_{CE}=V_{CES}, G-E short-circuited		-	-	1	mA
I_{GES}	Gate-emitter leakage current	V_{GE}=V_{GES}, C-E short-circuited		-	-	0.5	μA
$V_{GE(th)}$	Gate-emitter threshold voltage	I_C=20mA, V_{CE}=10 V		5.4	6.0	6.6	V
V_{CEsat} (Terminal)	Collector-emitter saturation voltage	I_C=200 A, V_{GE}=15 V, Auxiliary Terminal (Note5)	T_{vj}=25 °C	-	1.40	1.75	V
			T_{vj}=125 °C	-	1.50	-	
			T_{vj}=150 °C	-	1.50	-	
V_{CEsat} (Chip)		I_C=200 A, V_{GE}=15 V, Chip (Note5)	T_{vj}=25 °C	-	1.30	1.55	V
			T_{vj}=125 °C	-	1.35	-	
			T_{vj}=150 °C	-	1.35	-	
C_{ies}	Input capacitance	V_{CE}=10 V, G-E short-circuited		-	-	26.7	nF
C_{oes}	Output capacitance			-	-	1.1	
C_{res}	Reverse transfer capacitance			-	-	0.5	
Q_G	Gate charge	$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, I_C=200 A, V_{GE}=15 V		-	0.83	-	μC
$t_{d(on)}$	Turn-on delay time	$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, I_C=200 A, V_{GE}=±15 V, R_G=0 Ω, Inductive load		-	-	400	ns
t_r	Rise time			-	-	150	
$t_{d(off)}$	Turn-off delay time			-	-	500	
t_f	Fall time			-	-	400	
V_{EC} (Note1) (Terminal)	Emitter-collector voltage	I_E=200 A, G-E short-circuited, Auxiliary Terminal (Note5)	T_{vj}=25 °C	-	1.50	1.95	V
			T_{vj}=125 °C	-	1.60	-	
			T_{vj}=150 °C	-	1.60	-	
V_{EC} (Note1) (Chip)		I_E=200A, G-E short-circuited, Chip (Note5)	T_{vj}=25 °C	-	1.40	1.74	V
			T_{vj}=125 °C	-	1.45	-	
			T_{vj}=150 °C	-	1.45	-	
t_{rr} (Note1)	Reverse recovery time	$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, I_E=200 A, V_{GE}=±15 V,		-	-	450	ns
Q_{rr} (Note1)	Reverse recovery charge	R_G=3.3 Ω(Tr1/Tr4), Inductive load		-	19.0	-	μC
E_{on}	Turn-on switching energy per pulse	$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, I_C=I_E=200 A,	R_G(Tr2,3) =0 Ω	-	7.0	-	mJ
E_{off}	Turn-off switching energy per pulse	V_{GE}=±15 V, T_{vj}=150 °C,		-	9.9	-	
E_{rr} (Note1)	Reverse recovery energy per pulse	Inductive load	R_G(Tr1,4) =3.3 Ω	-	4.7	-	mJ
$R_{CC'+EE'}$	Internal lead resistance	Main terminals-chip, per switch, T_C=25 °C (Note4)		-	0.5	-	mΩ
r_g	Internal gate resistance	Per switch		-	3.0	-	Ω

ELECTRICAL CHARACTERISTICS (Cont; T_{vj}=25 °C, unless otherwise specified)

RECOMMENDED OPERATING CONDITIONS

Symbol	Item	Conditions		Limits			Unit
				Min.	Typ.	Max.	
$V_{CC(P-C)}$ $V_{CC(C-N)}$	(DC) Supply voltage	Applied across each of P to C and C to N		-	300	425	V
V_{GEon}	Gate (-emitter drive) voltage	Applied across emitter to gate of each IGBT		13.5	15.0	16.5	V
R_G	External gate resistance	Per switch	Tr2, Tr3	0	-	16	Ω

NTC THERMISTOR PART

Symbol	Item	Conditions	Limits			Unit
			Min.	Typ.	Max.	
R_{25}	Zero-power resistance	T_C=25 °C (Note4)	4.85	5.00	5.15	kΩ
ΔR/R	Deviation of resistance	R_{100}=493 Ω, T_C=100 °C (Note4)	-7.3	-	+7.8	%
$B_{(25/50)}$	B-constant	Approximate by equation (Note6)	-	3375	-	K
P_{25}	Power dissipation	T_C=25 °C (Note4)	-	-	10	mW

THERMAL RESISTANCE CHARACTERISTICS

Symbol	Item	Conditions	Limits			Unit
			Min.	Typ.	Max.	
$R_{th(j-c)Q}$	Thermal resistance	Junction to case, per BRIDGE PART IGBT (Note4)	-	-	147	K/kW
$R_{th(j-c)D}$		Junction to case, per BRIDGE PART FWD (Note4)	-	-	229	
$R_{th(j-c)Q}$		Junction to case, per AC SWITCH PART IGBT (Note4)	-	-	215	
$R_{th(j-c)D}$		Junction to case, per AC SWITCH PART FWD (Note4)	-	-	330	
$R_{th(c-s)}$	Contact thermal resistance	Case to heat sink, per 1 module, Thermal grease applied (Note4, 7, 9)	-	11	-	K/kW

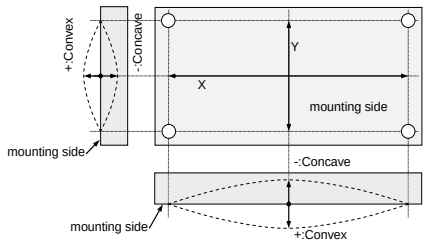
MECHANICAL CHARACTERISTICS

Symbol	Item	Conditions		Limits			Unit
				Min.	Typ.	Max.	
M_t	Mounting torque	Main terminals	M 6 screw	3.5	4.0	4.5	N·m
M_s	Mounting torque	Mounting to heat sink	M 5 screw	2.5	3.0	3.5	N·m
m	mass	-		-	560	-	g
d_s	Creepage distance	Terminal to terminal		14.4	-	-	mm
		Terminal to base plate		16.7	-	-	
d_a	Clearance	Terminal to terminal		8.0	-	-	mm
		Terminal to base plate		16.7	-	-	
e_c	Flatness of base plate	On the centerline X, Y (Note8)		-50	-	100	μm

*: This product is compliant with the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) directive 2011/65/EU and (EU)2015/863.

Note1. Represent ratings and characteristics of the anti-parallel, emitter-collector free wheeling diode (FWD).
2. Junction temperature (T_{vj}) should not increase beyond T_{vjmax} rating.
3. Pulse width and repetition rate should be such that the device junction temperature (T_{vj}) dose not exceed T_{vjmax} rating.
4. Case temperature (T_C) and heat sink temperature (T_s) are defined on the each surface (mounting side) of base plate and heat sink just under the chips. Refer to the figure of chip location.
5. Pulse width and repetition rate should be such as to cause negligible temperature rise.
6. $B_{(25/50)} = \ln(\frac{R_{25}}{R_{50}}) / (\frac{1}{T_{25}} - \frac{1}{T_{50}})$

   R_{25}: resistance at absolute temperature T_{25} [K]; T_{25}=25 [°C]+273.15=298.15 [K]
   R_{50}: resistance at absolute temperature T_{50} [K]; T_{50}=50 [°C]+273.15=323.15 [K]
7. Typical value is measured by using thermally conductive grease of λ=0.9 W/(m·K).
8. The base plate (mounting side) flatness measurement points (X, Y) are as follows of the next figure.



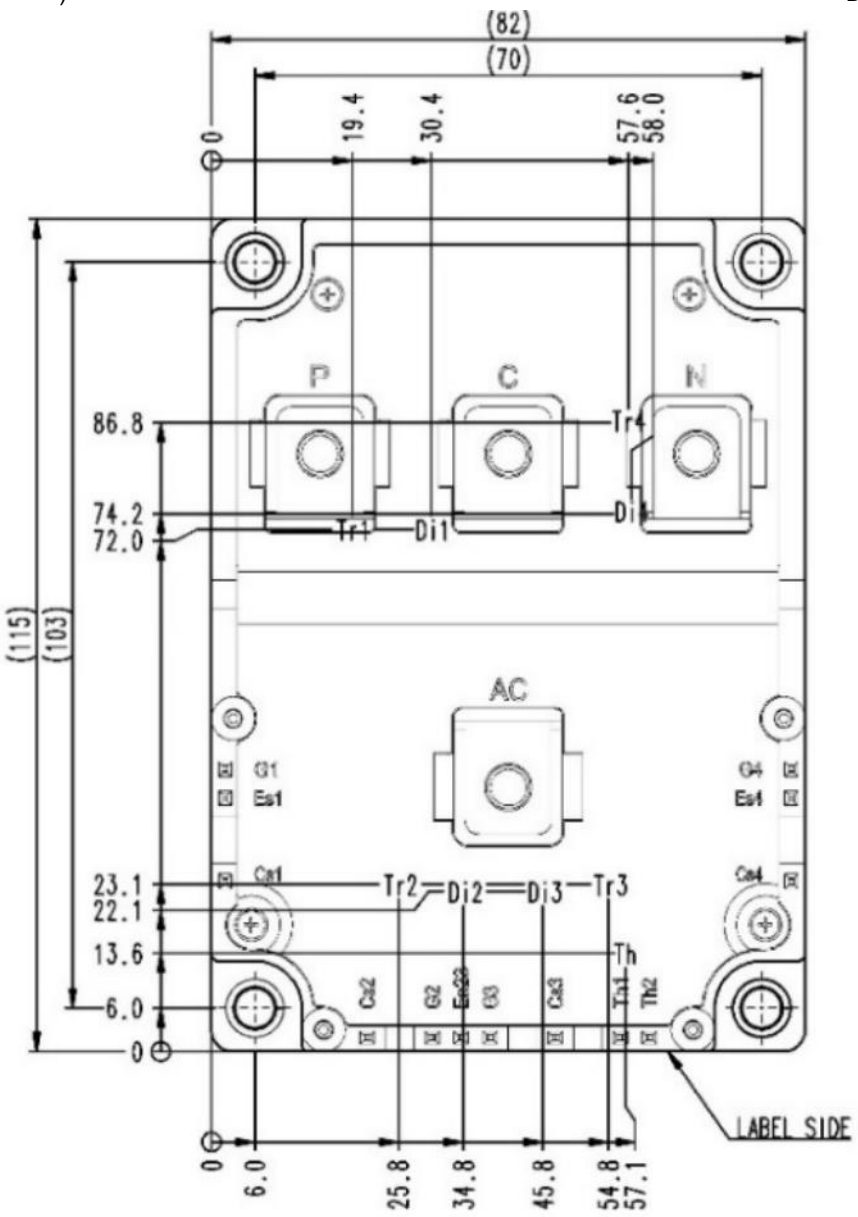
Note9. Long term performance related to thermal conductive grease (including but not limited to aspects such as the increase of thermal resistance due to pumping out, etc.) should be verified under your specific application conditions. Each temperature condition ($T_{vj\ max}$, $T_{vj\ op}$, $T_{C\ max}$) must be maintained below the maximum rated temperature throughout consideration of the temperature rise even for long term usage.

10. Use the following screws when mounting the printed circuit board (PCB) on the standoffs.
The length of the screw depends on thickness (t1.0~t1.6) of the PCB.

	Type	Size	Tightening torque	Recommended tightening method
(1)	PT®	K25×8	0.55 ± 0.055 N･m	by handwork (equivalent to 30 r/min by mechanical screw driver) ~ 600 r/min (by mechanical screw driver)
(2)	PT®	K25×10	0.75 ± 0.075 N･m	
(3)	DELTA PT®	25×8	0.55 ± 0.055 N･m	
(4)	DELTA PT®	25×10	0.75 ± 0.075 N･m	
(5)	B1 tapping screw	φ2.6×10 or φ2.6×12	0.75 ± 0.075 N･m	

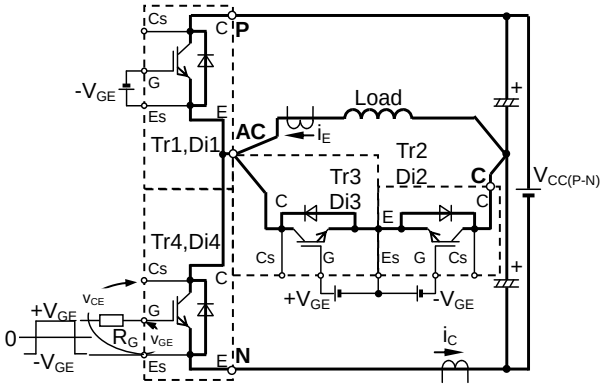
CHIP LOCATION (Top view)

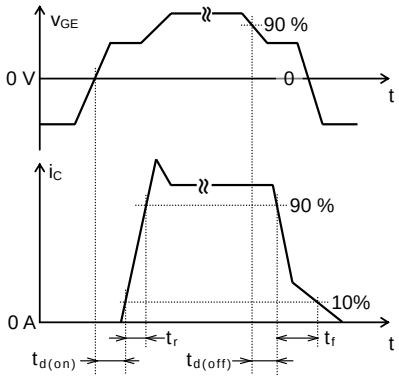
Dimension in mm, tolerance: ±1 mm



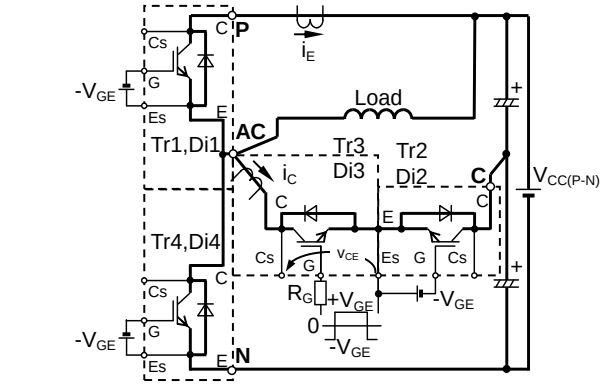
Tr1/Tr4: BRIDGE IGBT, Tr2/Tr3: AC SWITCH IGBT,
Di1/Di4: BRIDGE FWD, Di2/Di3: AC SWITCH FWD,
Th: NTC thermistor.

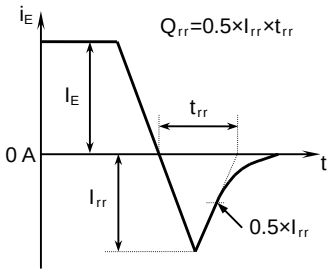
TEST CIRCUIT AND WAVEFORMS





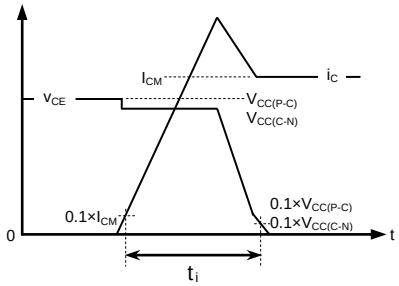
Switching test circuit and waveforms (BRIDGE PART switching)



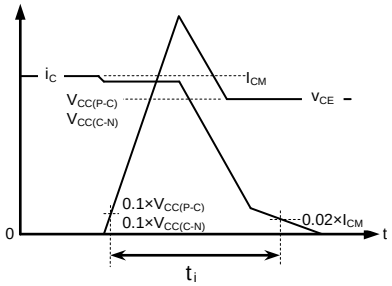


Switching test circuit and waveforms (AC SWITCH PART switching)

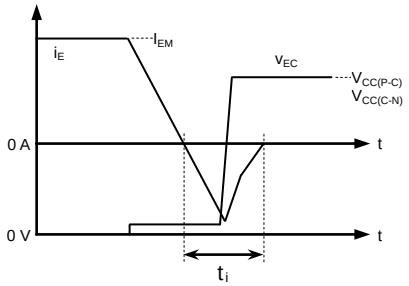
trr, Qrr test waveform



IGBT Turn-on switching energy



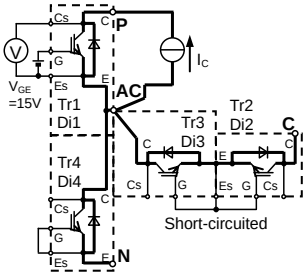
IGBT Turn-off switching energy

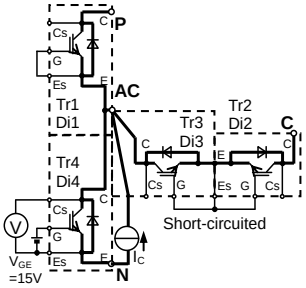


FWD Reverse recovery energy

Turn-on / Turn-off switching energy and Reverse recovery energy test waveforms (Integral time instruction drawing)

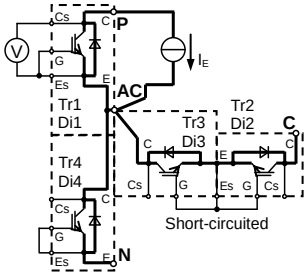
TEST CIRCUIT

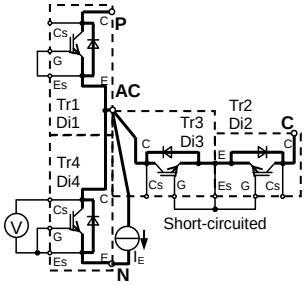




Tr1 Tr4

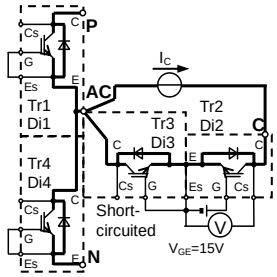
V_{CEsat} characteristics test circuit (BRIDGE PART)

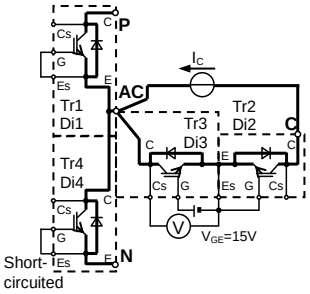




Di1 Di4

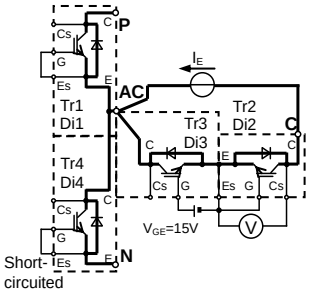
V_{EC} characteristics test circuit (BRIDGE PART)

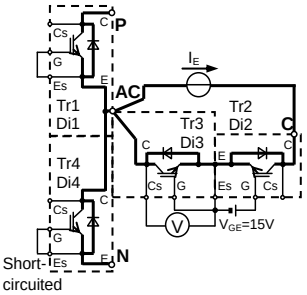




Tr2 Tr3

V_{CEsat} characteristics test circuit (AC SWITCH PART)





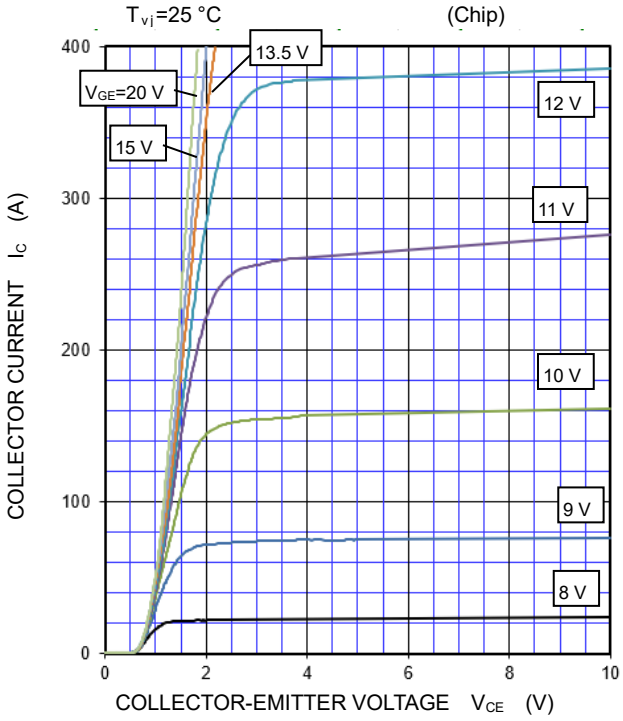
Di2 Di3

V_{EC} characteristics test circuit (AC SWITCH PART)

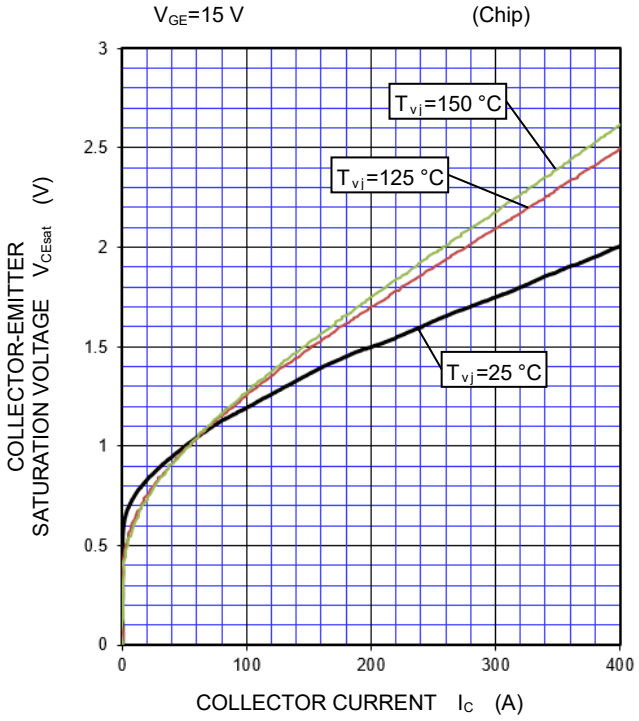
PERFORMANCE CURVES

BRIDGE PART

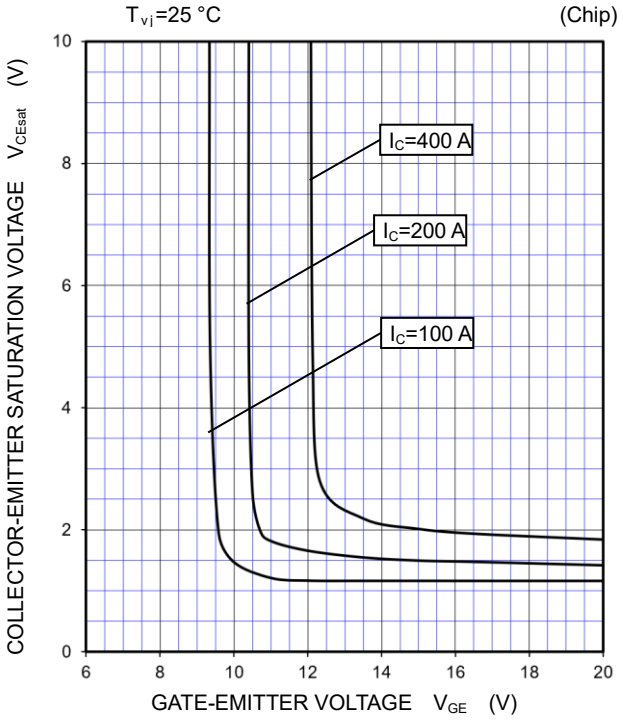
OUTPUT CHARACTERISTICS (TYPICAL)



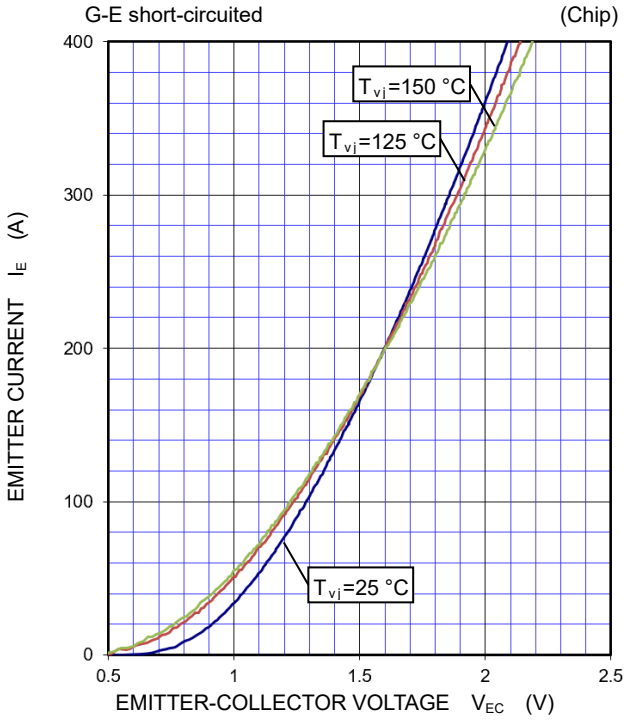
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



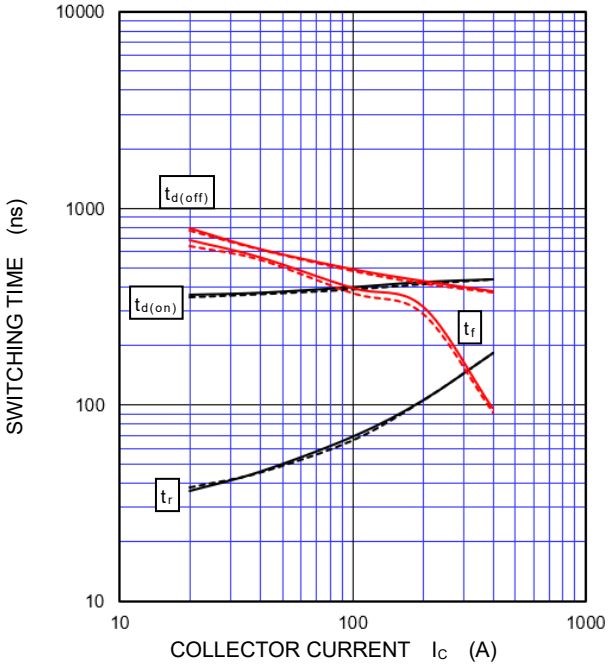
FREE WHEELING DIODE FORWARD CHARACTERISTICS (TYPICAL)



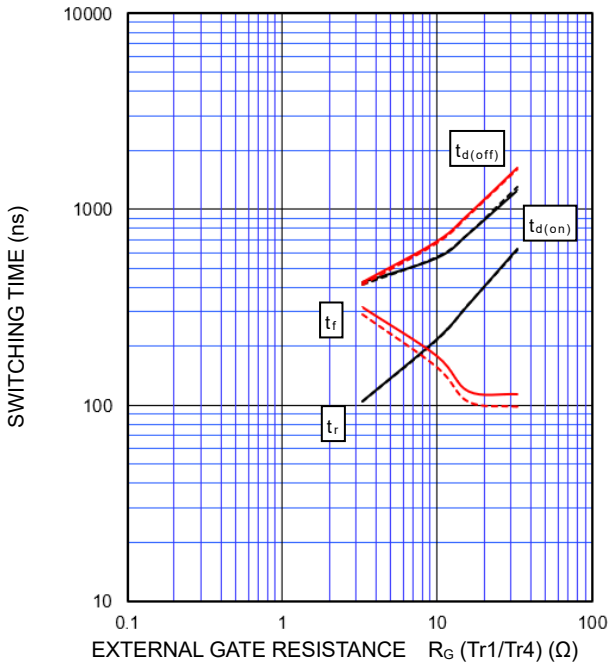
PERFORMANCE CURVES

BRIDGE PART

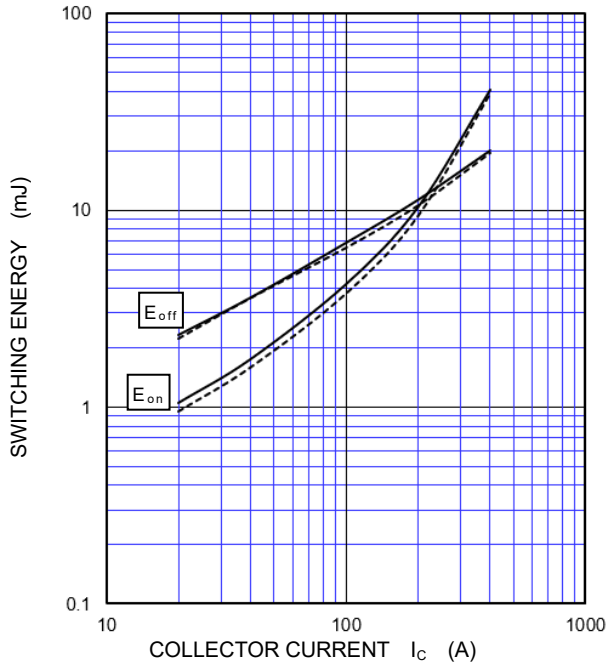
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)
$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, V_{GE}=±15 V, R_G=3.3 Ω(Tr1/Tr4),
INDUCTIVE LOAD
————: T_{vj}=150 °C, - - - - -: T_{vj}=125 °C



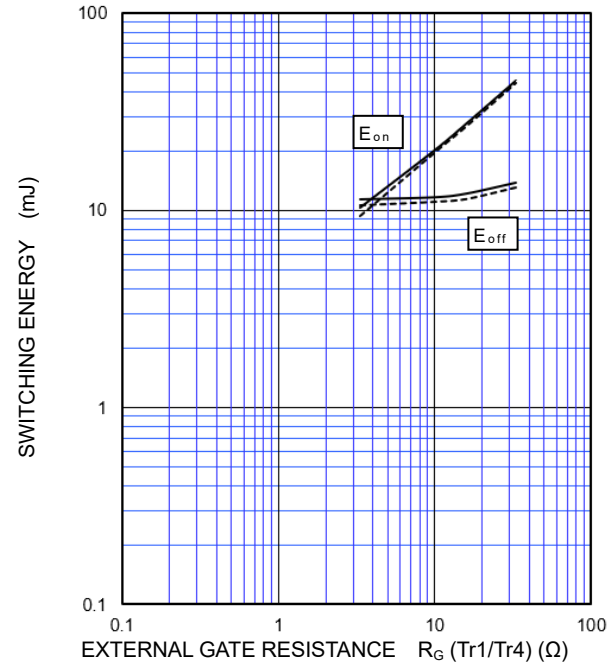
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)
$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, V_{GE}=±15 V, I_C=200 A,
INDUCTIVE LOAD
————: T_{vj}=150 °C, - - - - -: T_{vj}=125 °C



HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)
$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, V_{GE}=±15 V, R_G=3.3 Ω(Tr1/Tr4),
INDUCTIVE LOAD, PER PULSE
————: T_{vj}=150 °C, - - - - -: T_{vj}=125 °C



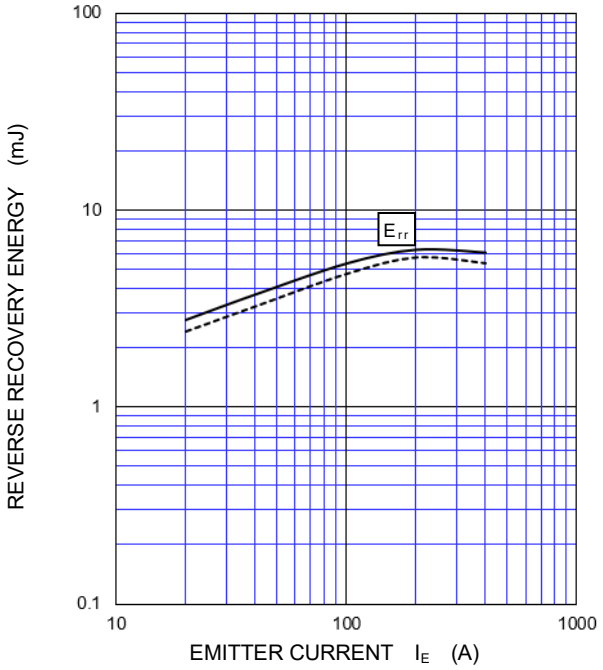
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)
$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, V_{GE}=±15 V, I_C=200 A,
INDUCTIVE LOAD, PER PULSE
————: T_{vj}=150 °C, - - - - -: T_{vj}=125 °C



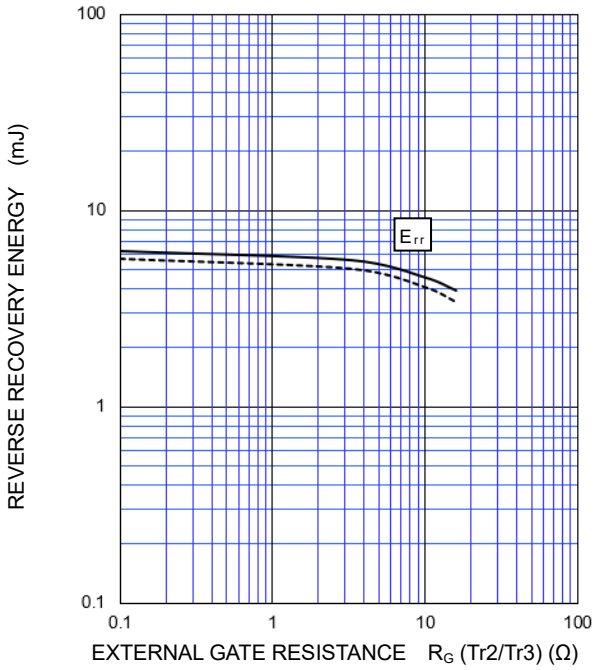
PERFORMANCE CURVES

BRIDGE PART

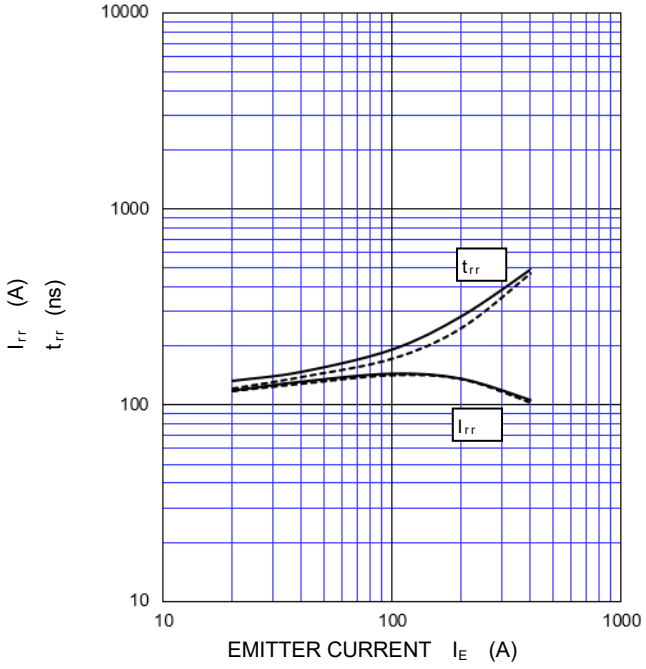
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)
$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, V_{GE}=±15 V, R_G=0 Ω (Tr2/Tr3),
INDUCTIVE LOAD, PER PULSE
————: T_{vj}=150 °C, - - - - -: T_{vj}=125 °C



HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)
$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, V_{GE}=±15 V, I_E=200 A,
INDUCTIVE LOAD, PER PULSE
————: T_{vj}=150 °C, - - - - -: T_{vj}=125 °C



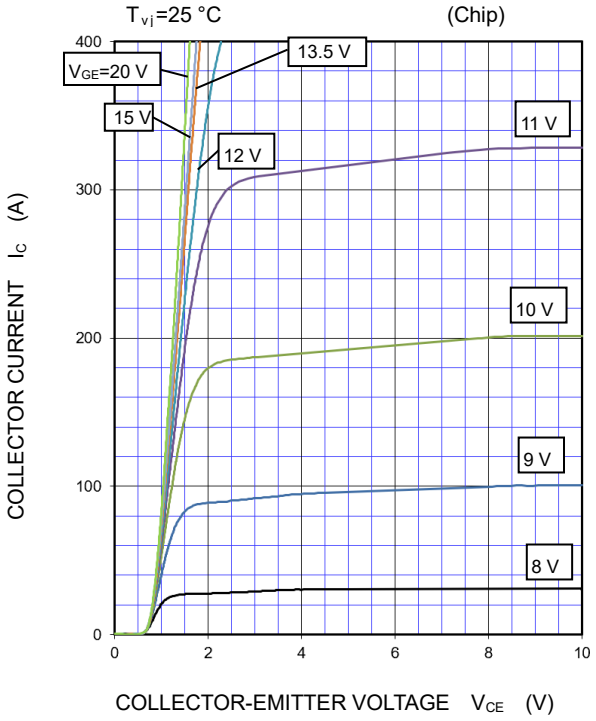
FREE WHEELING DIODE
REVERSE RECOVERY CHARACTERISTICS
(TYPICAL)
$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, V_{GE}=±15 V, R_G=0 Ω (Tr2/Tr3),
INDUCTIVE LOAD
————: T_{vj}=150 °C, - - - - -: T_{vj}=125 °C



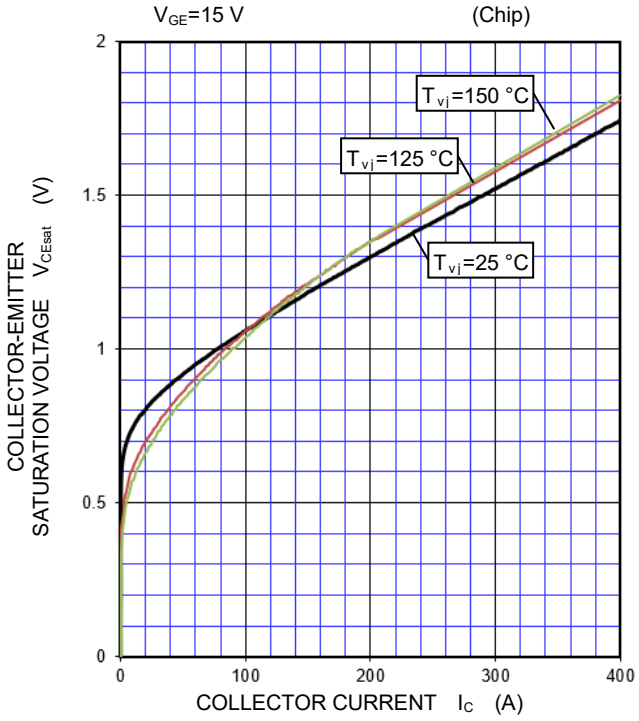
PERFORMANCE CURVES

AC SWITCH PART

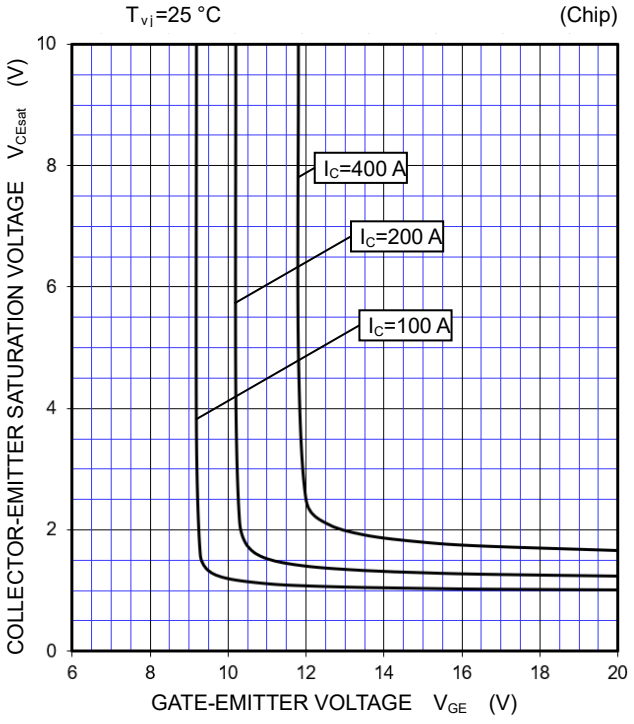
OUTPUT CHARACTERISTICS (TYPICAL)



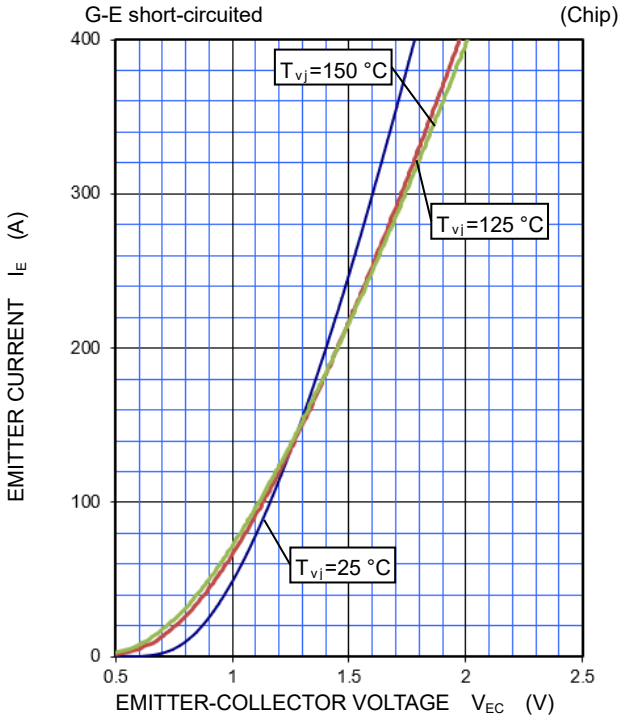
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



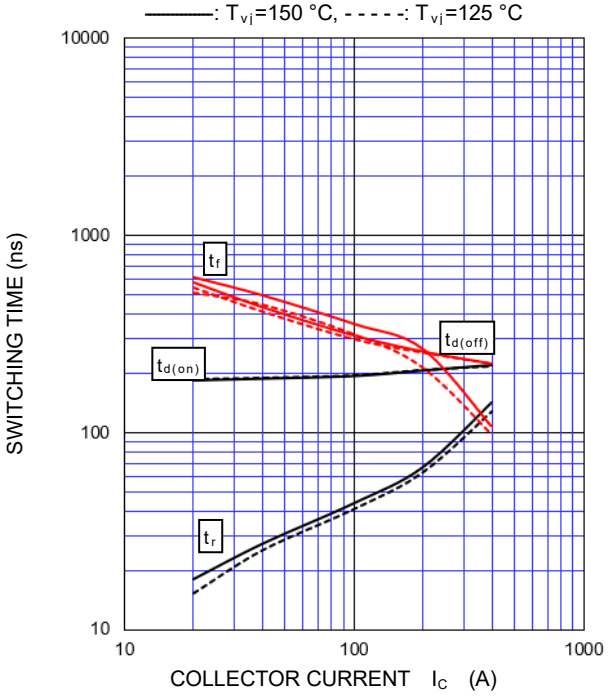
FREE WHEELING DIODE FORWARD CHARACTERISTICS (TYPICAL)



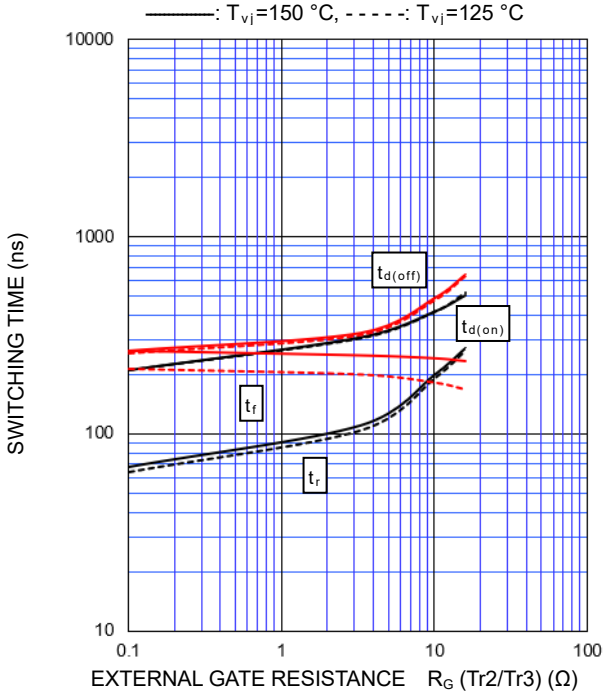
PERFORMANCE CURVES

AC SWITCH PART

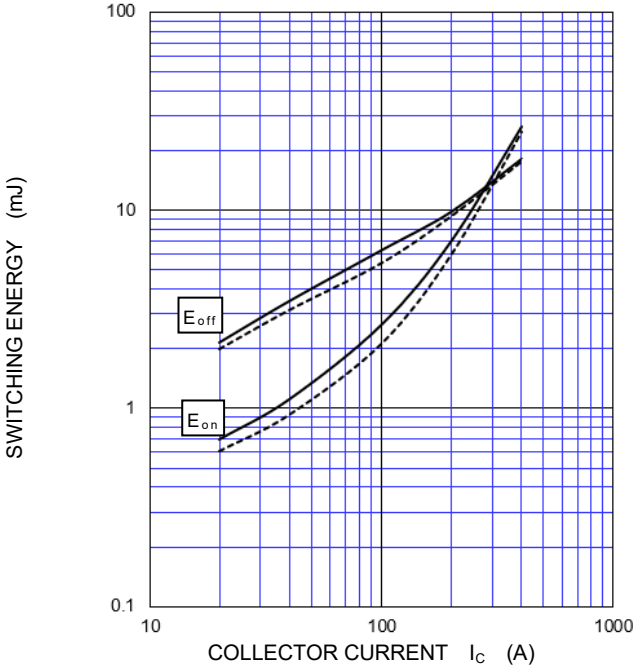
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)
$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, V_{GE}=±15 V, R_G=0 Ω(Tr2/Tr3),
INDUCTIVE LOAD
————: T_{vj}=150 °C, - - - - -: T_{vj}=125 °C



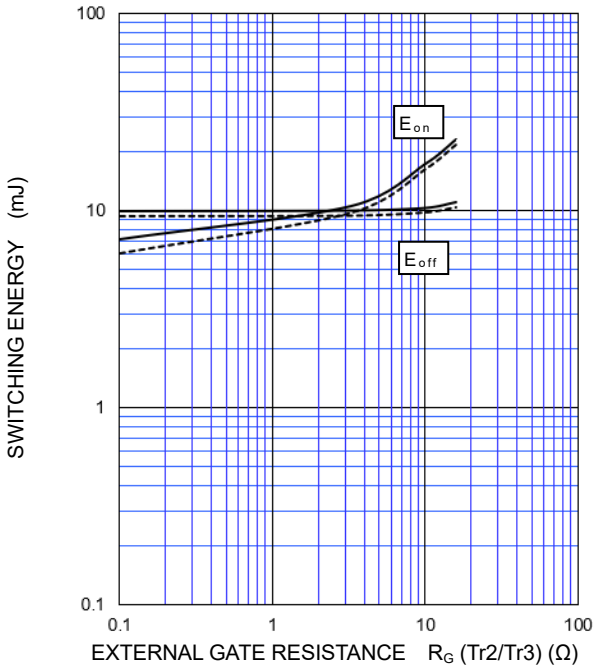
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)
$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, V_{GE}=±15 V, I_C=200 A,
INDUCTIVE LOAD
————: T_{vj}=150 °C, - - - - -: T_{vj}=125 °C



HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)
$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, V_{GE}=±15 V, R_G=0 Ω(Tr2/Tr3),
INDUCTIVE LOAD, PER PULSE
————: T_{vj}=150 °C, - - - - -: T_{vj}=125 °C



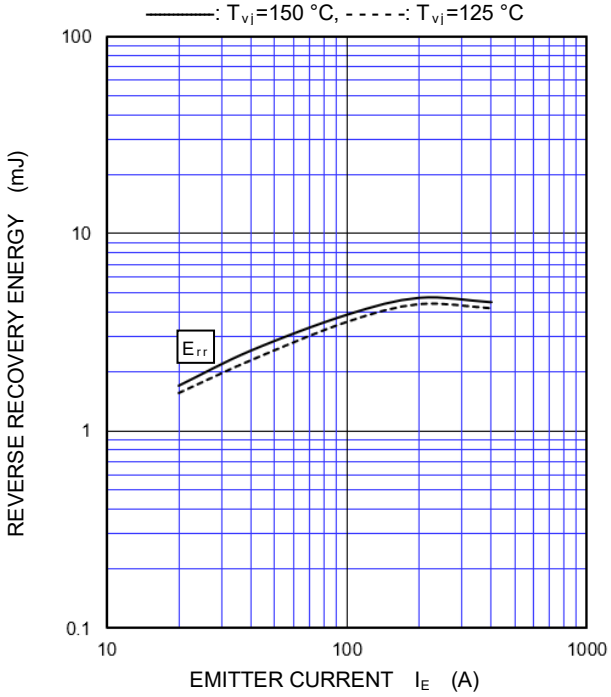
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)
$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, V_{GE}=±15 V, I_C=200 A,
INDUCTIVE LOAD, PER PULSE
————: T_{vj}=150 °C, - - - - -: T_{vj}=125 °C



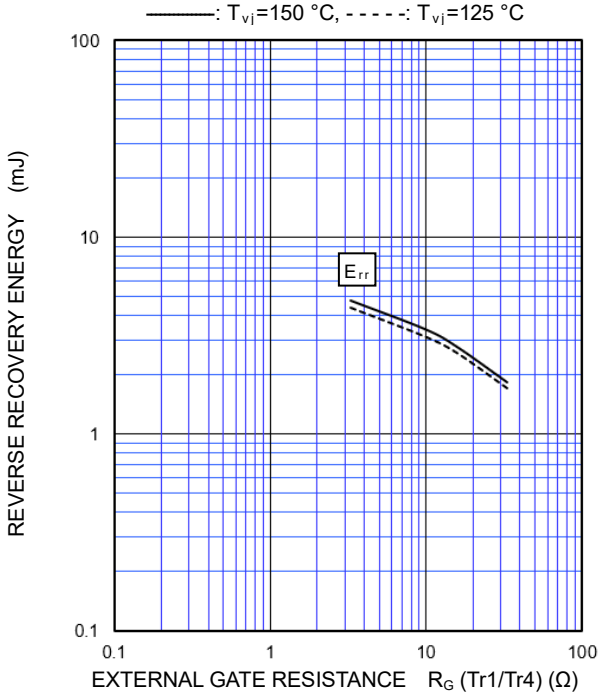
PERFORMANCE CURVES

AC SWITCH PART

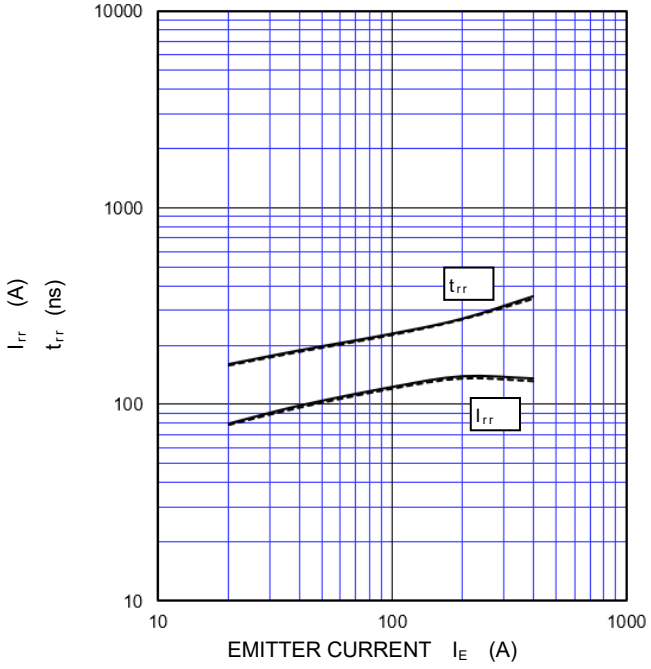
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)
$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, V_{GE}=±15 V, R_G=3.3 Ω (Tr1/Tr4),
INDUCTIVE LOAD, PER PULSE
————: T_{vj}=150 °C, - - - - -: T_{vj}=125 °C



HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)
$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, V_{GE}=±15 V, I_E=200 A,
INDUCTIVE LOAD, PER PULSE
————: T_{vj}=150 °C, - - - - -: T_{vj}=125 °C



FREE WHEELING DIODE
REVERSE RECOVERY CHARACTERISTICS
(TYPICAL)
$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, V_{GE}=±15 V, R_G=3.3 Ω (Tr1/Tr4),
INDUCTIVE LOAD
————: T_{vj}=150 °C, - - - - -: T_{vj}=125 °C

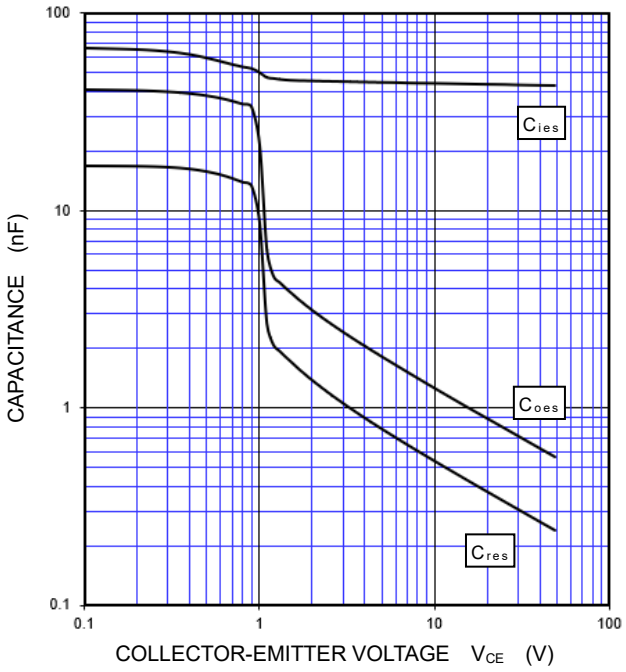


PERFORMANCE CURVES

BRIDGE PART

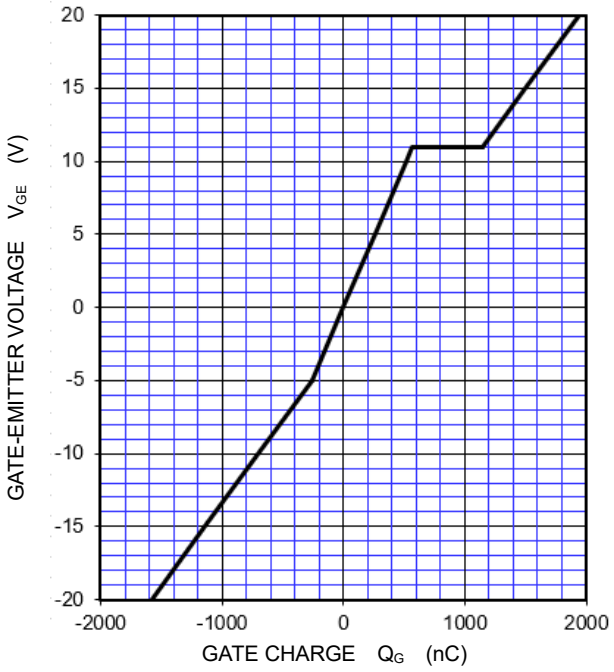
CAPACITANCE CHARACTERISTICS (TYPICAL)

G-E short-circuited, T_{vj}=25 °C



GATE CHARGE CHARACTERISTICS (TYPICAL)

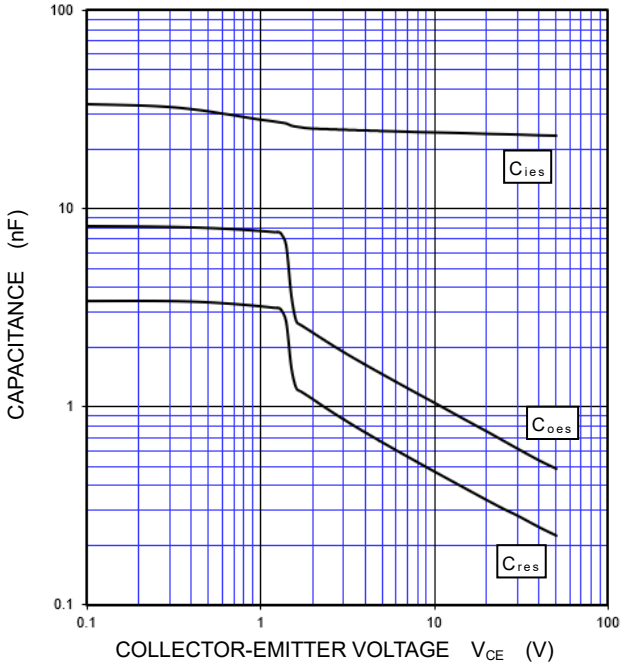
$V_{CC(P-C)}$=$V_{CC(C-N)}$=300 V, I_C=200 A, T_{vj}=25 °C



AC SWITCH PART

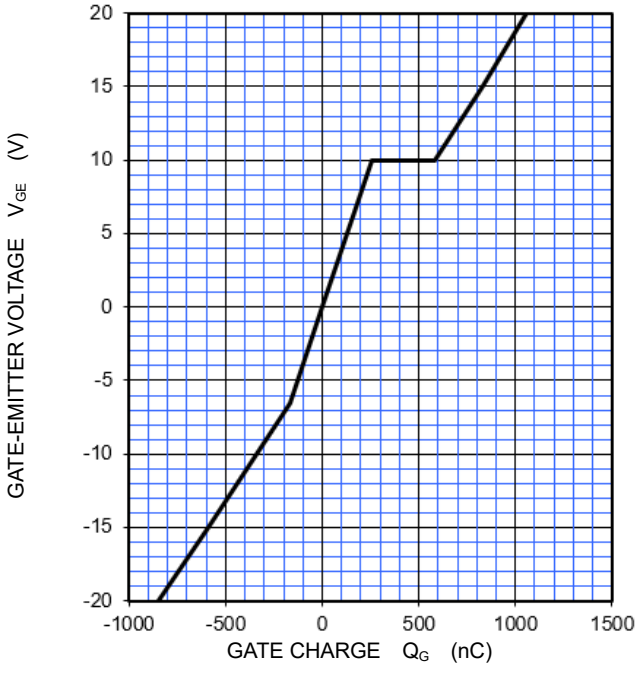
CAPACITANCE CHARACTERISTICS (TYPICAL)

G-E short-circuited, T_{vj}=25 °C



GATE CHARGE CHARACTERISTICS (TYPICAL)

$V_{CC(P-C)}$= $V_{CC(C-N)}$=300 V, I_C=200 A, T_{vj}=25 °C

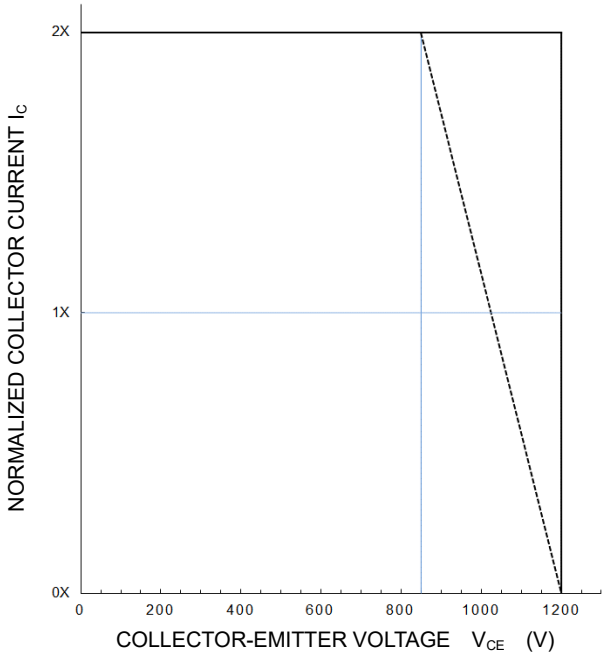


PERFORMANCE CURVES

BRIDGE PART

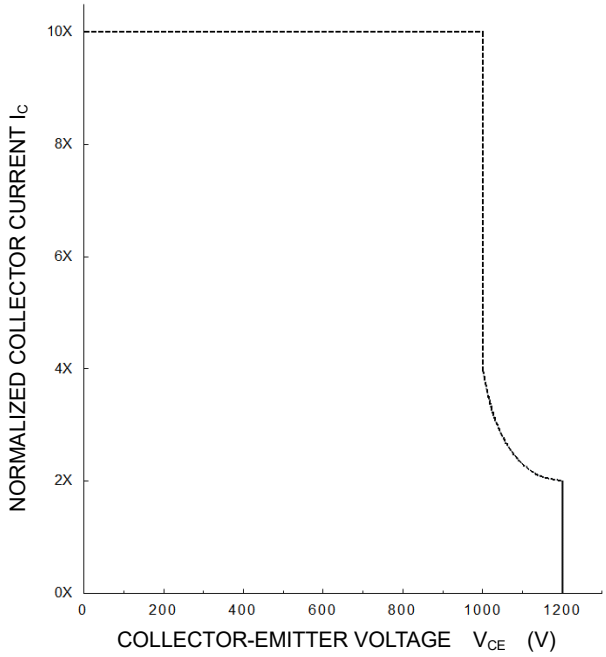
TURN-OFF SWITCHING SAFE OPERATING AREA (REVERSE BIAS SAFE OPERATING AREA) (MAXIMUM)

V_{CC}≤850 V, R_G=3.3~33 Ω, V_{GE}=±15 V,
————: T_{vj}=25~150 °C (Normal load operations (Continuous)
- - - - - -: T_{vj}=175 °C (Unusual load operations (Limited period)



SHORT-CIRCUIT SAFE OPERATING AREA (MAXIMUM)

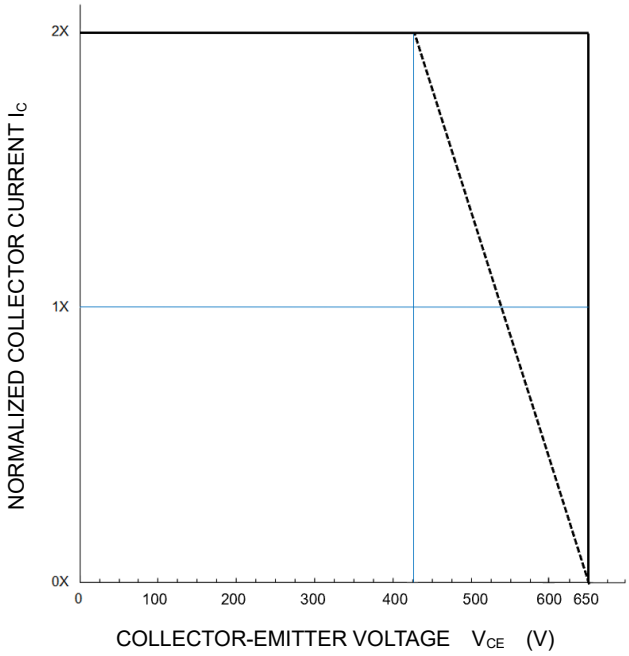
V_{CC}≤800 V, R_G=3.3~33 Ω, V_{GE}=±15 V,
T_{vj}= 25 ~ 150 °C, t_W≤6 μs, Non-Repetitive



AC SWITCH PART

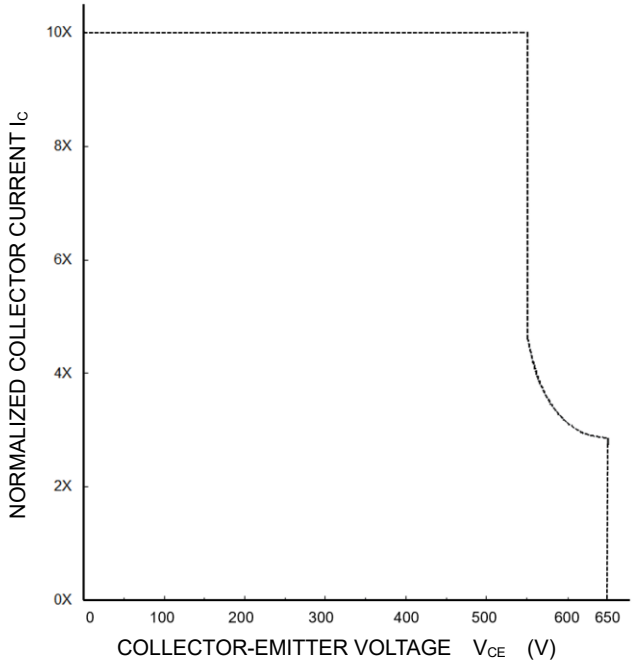
TURN-OFF SWITCHING SAFE OPERATIONG AREA (REVERSE BIAS SAFE OPERATING AREA) (MAXIMUM)

V_{CC}≤425 V, R_G=0~16 Ω, V_{GE}=±15 V,
————: T_{vj}=25~150 °C (Normal load operations (Continuous)
- - - - - -: T_{vj}=175 °C (Unusual load operations (Limited period)



SHORT-CIRCUIT SAFE OPERATING AREA (MAXIMUM)

V_{CC}≤400 V, R_G=0~16 Ω, V_{GE}=±15 V,
T_{vj}= 25 ~ 150 °C, t_W≤6 μs, Non-Repetitive



PERFORMANCE CURVES

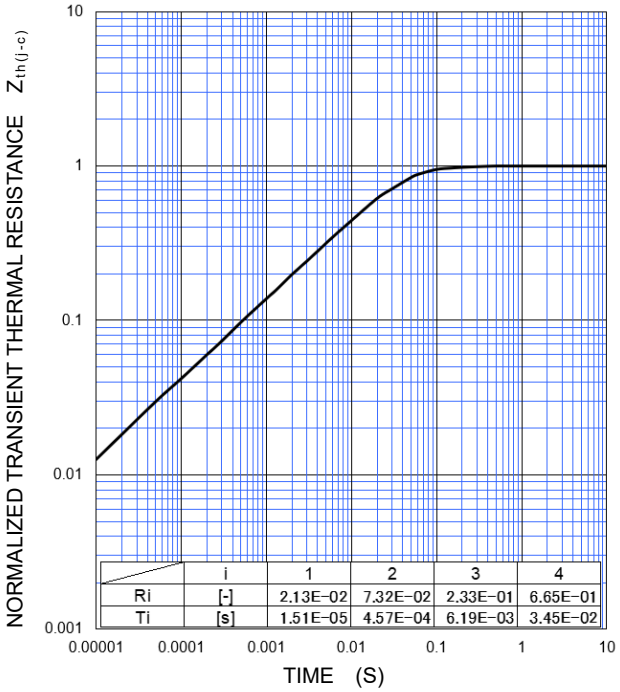
COMMON PART

TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (MAXIMUM)

Single pulse, T_C=25 °C

BRIDGE PART: $R_{th(j-c)Q}$=147 K/kW, $R_{th(j-c)D}$=229 K/kW

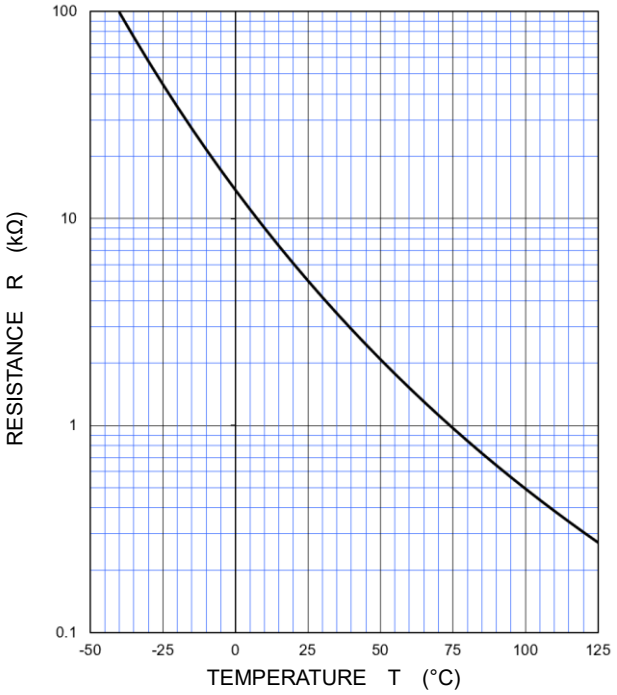
AC SWITCH PART: $R_{th(j-c)Q}$=215 K/kW, $R_{th(j-c)D}$=330 K/kW



	i	1	2	3	4
Ri	[-]	2.13E−02	7.32E−02	2.33E−01	6.65E−01
Ti	[s]	1.51E−05	4.57E−04	6.19E−03	3.45E−02

NTC THERMISTOR PART

TEMPERATURE CHARACTERISTICS (TYPICAL)



Note: The characteristics curves are presented reference only and not guaranteed by production test, unless otherwise noted.

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