

RGW00TS65DHR

650V 50A Field Stop Trench IGBT

V _{CES}	650V
I _{C (100°C)}	50A
V _{CE(sat) (Typ.)}	1.5V
P _D	254W

Features

- 1) AEC-Q101 Qualified
- 2) Low Collector Emitter Saturation Voltage
- 3) Low Switching Loss & Soft Switching
- 4) Built in Very Fast & Soft Recovery FRD
- 5) Pb free Lead Plating ; RoHS Compliant

Application

Automotive

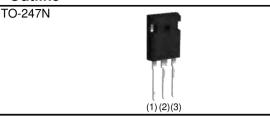
On & Off Board Chargers

DC-DC Converters

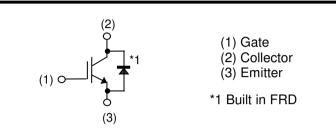
PFC

Industrial Inverter

Outline



Inner Circuit



Packaging Specifications

	Packaging	Tube
	Reel Size (mm)	-
Tuno	Tape Width (mm)	-
Туре	Basic Ordering Unit (pcs)	450
	Packing Code	C11
	Marking	RGW00TS65D

•Absolute Maximum Ratings (at T_c = 25°C unless otherwise specified)

Parameter		Symbol	Value	Unit	
Collector - Emitter Voltage		V _{CES}	650	V	
Gate - Emitter Voltage		V _{GES}	±30	V	
Collector Current	$T_{\rm C} = 25^{\circ}{\rm C}$	Ι _C	96	Α	
Collector Current	$T_{\rm C} = 100^{\circ}{\rm C}$	۱ _C	58	Α	
Pulsed Collector Current		I _{CP} *1	200	А	
Diada Famuland Quinnant	$T_{\rm C} = 25^{\circ}{\rm C}$	I _F	56	А	
Diode Forward Current	$T_{C} = 100^{\circ}C$	١ _F	33	А	
Diode Pulsed Forward Current		I _{FP} ^{*1}	200	Α	
$T_c = 25^{\circ}C$		P _D	254	W	
Power Dissipation	$T_{\rm C} = 100^{\circ}{\rm C}$	P _D	127	W	
Operating Junction Temperature		Tj	-40 to +175	°C	
Storage Temperature		T _{stg}	-55 to +175	°C	

*1 Pulse width limited by $T_{jmax.}$

•Thermal Resistance

Baramatar	Sumbol	Values			Unit
Parameter	Symbol	Min.	Тур.	Max.	Unit
Thermal Resistance IGBT Junction - Case	$R_{\theta(j\text{-}c)}$	-	-	0.59	°C/W
Thermal Resistance Diode Junction - Case	$R_{\theta(j\text{-}c)}$	-	-	1.17	°C/W

●IGBT Electrical Characteristics (at T_j = 25°C unless otherwise specified)

Parameter	Symbol Conditions		Values			Unit
	Symbol	Conditions	Min.	Тур.	Max.	Unit
Collector - Emitter Breakdown Voltage	BV _{CES}	$I_{\rm C}$ = 10µA, $V_{\rm GE}$ = 0V	650	-	-	V
Collector Cut - off Current	I _{CES}	$V_{CE} = 650V, V_{GE} = 0V$	-	-	10	μA
Gate - Emitter Leakage Current	I _{GES}	$V_{GE} = \pm 30V, V_{CE} = 0V$	-	-	±200	nA
Gate - Emitter Threshold Voltage	$V_{GE(th)}$	V _{CE} = 5V, I _C = 33.0mA	5.0	6.0	7.0	V
Collector - Emitter Saturation Voltage	V _{CE(sat)}	$I_{C} = 50A, V_{GE} = 15V,$ $T_{j} = 25^{\circ}C$ $T_{j} = 175^{\circ}C$	-	1.5 1.85	1.9 -	V

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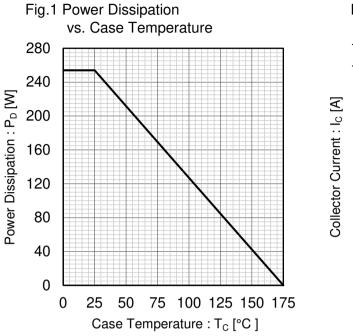
•IGBT Electrical Characteristics (at $T_j = 25^{\circ}C$ unless otherwise specified)

Parameter	Symbol	Values			l lucit	
Parameter	Symbol	Conditions	Min.	Тур.	Max.	Unit
Input Capacitance	C _{ies}	$V_{CE} = 30V,$	-	4200	-	
Output Capacitance	C _{oes}	$V_{GE} = 0V,$	-	104	-	pF
Reverse transfer Capacitance	C _{res}	f = 1MHz	-	79	-	
Total Gate Charge	Qg	V _{CE} = 400V,	-	141	-	
Gate - Emitter Charge	Q_{ge}	I _C = 50A,	-	30	-	nC
Gate - Collector Charge	Q_{gc}	V _{GE} = 15V	-	52	-	
Turn - on Delay Time	t _{d(on)}		-	48	-	
Rise Time	t _r	$I_{C} = 25A, V_{CC} = 400V,$ $V_{GE} = 15V, R_{G} = 10\Omega,$	-	13	-	ns
Turn - off Delay Time	$t_{d(off)}$	$T_{i} = 25^{\circ}C$	-	186	-	
Fall Time	t _f	Inductive Load	-	37	-	
Turn - on Switching Loss	E _{on}	*E _{on} include diode reverse recovery	-	0.43	-	ml
Turn - off Switching Loss	E _{off}	,	-	0.44	-	mJ
Turn - on Delay Time	t _{d(on)}		-	45	-	
Rise Time	t _r	$I_{C} = 25A, V_{CC} = 400V,$ $V_{GE} = 15V, R_{G} = 10\Omega,$	-	15	-	20
Turn - off Delay Time	t _{d(off)}	$T_{i} = 175^{\circ}C$	-	218	-	ns
Fall Time	t _f	Inductive Load	-	76	-	
Turn - on Switching Loss	Eon	*E _{on} include diode reverse recovery	-	0.44	-	mJ
Turn - off Switching Loss	E _{off}	· · · · · · · · · · · · · · · · · · ·	-	0.63	-	ШJ
Reverse Bias Safe Operating Area	RBSOA	$\begin{split} &I_{C} = 200 \text{A}, \ V_{CC} = 520 \text{V}, \\ &V_{P} = 650 \text{V}, \ V_{GE} = 15 \text{V}, \\ &R_{G} = 100 \Omega, \ T_{j} = 175^{\circ} \text{C} \end{split}$	FU	ILL SQUA	RE	-

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•FRD Electrical Characteristics (at $T_j = 25^{\circ}C$ unless otherwise specified)

Parameter	Symbol	Conditions	Values			Linit
Faiametei	Symbol		Min.	Тур.	Max.	Unit
		I _F = 30A,				
Diode Forward Voltage	V_{F}	$T_j = 25^{\circ}C$	-	1.45	1.9	V
		$T_j = 175^{\circ}C$	-	1.55	-	
Diode Reverse Recovery Time	t _{rr}		-	90	-	ns
Diode Peak Reverse Recovery Current	I _{rr}	I _F = 25A, V _{CC} = 400V,	-	7.9	-	A
Diode Reverse Recovery Charge	Q _{rr}	di _F /dt = 200A/µs, T _j = 25°C	-	0.39	-	μC
Diode Reverse Recovery Energy	E _{rr}		-	19.0	-	μJ
Diode Reverse Recovery Time	t _{rr}	I _F = 25A, V _{CC} = 400V, di _F /dt = 200A/µs, T _j = 175°C	-	161	_	ns
Diode Peak Reverse Recovery Current	I _{rr}		-	10.8	-	A
Diode Reverse Recovery Charge	Q _{rr}		-	1.03	-	μC
Diode Reverse Recovery Energy	E _{rr}		-	73.1	_	μJ



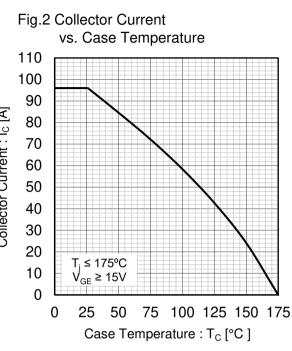
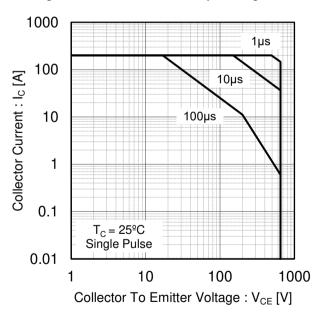


Fig.3 Forward Bias Safe Operating Area





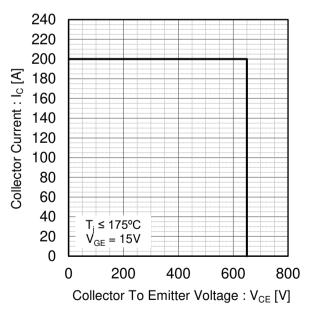


Fig.5 Typical Output Characteristics

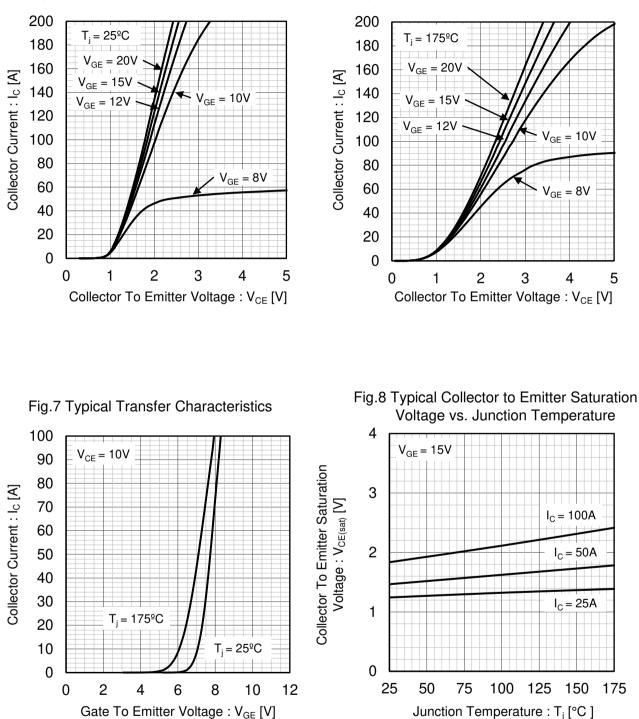
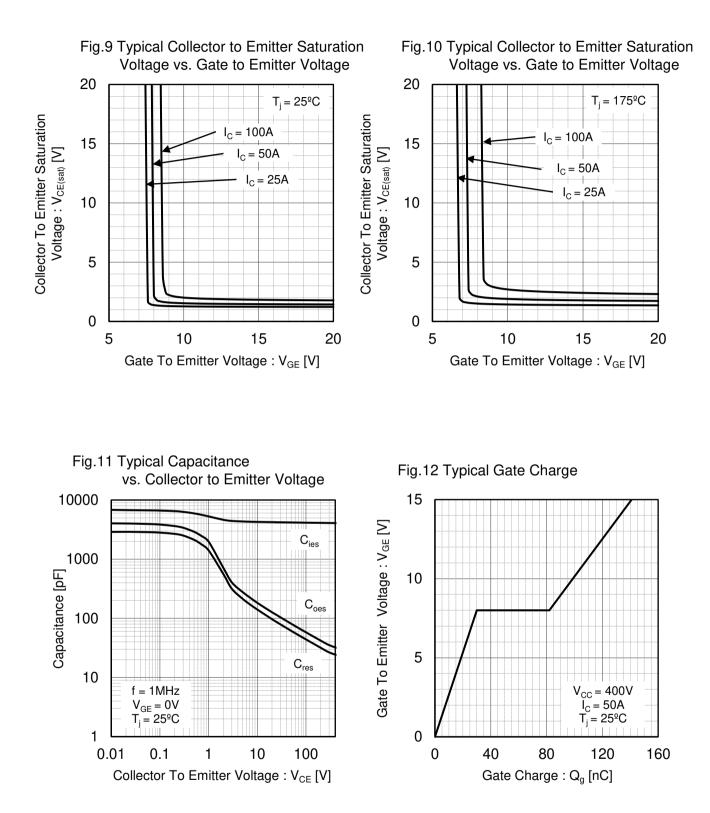
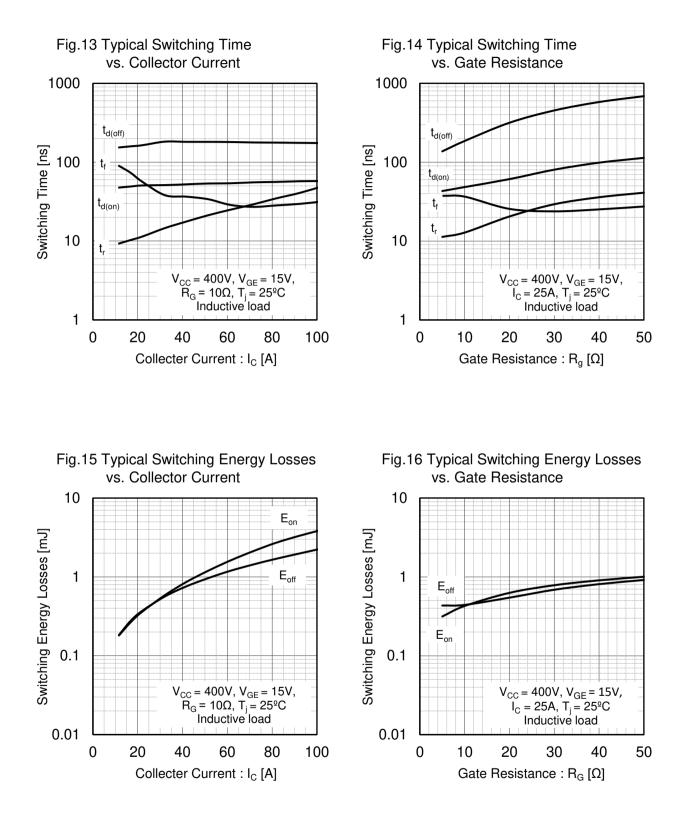
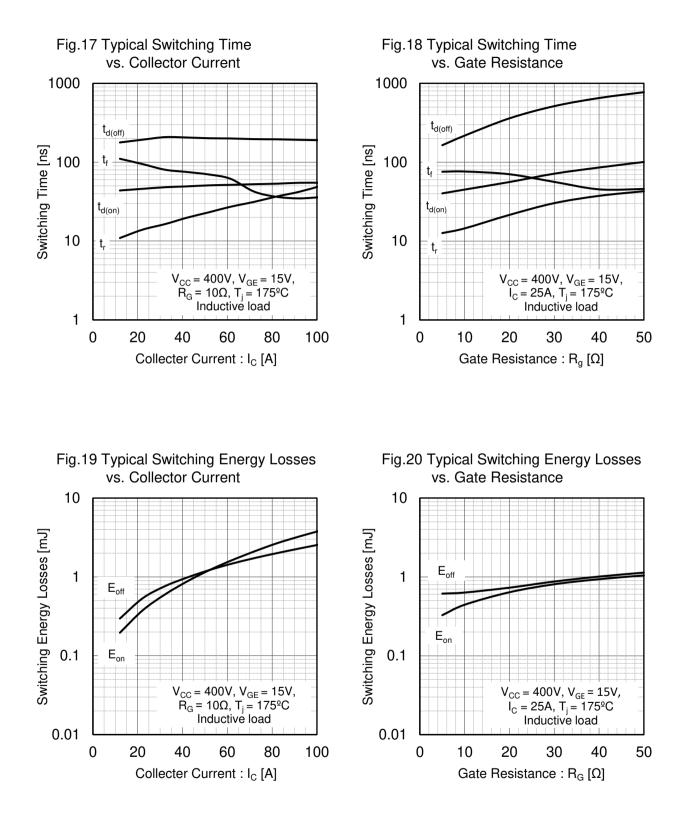
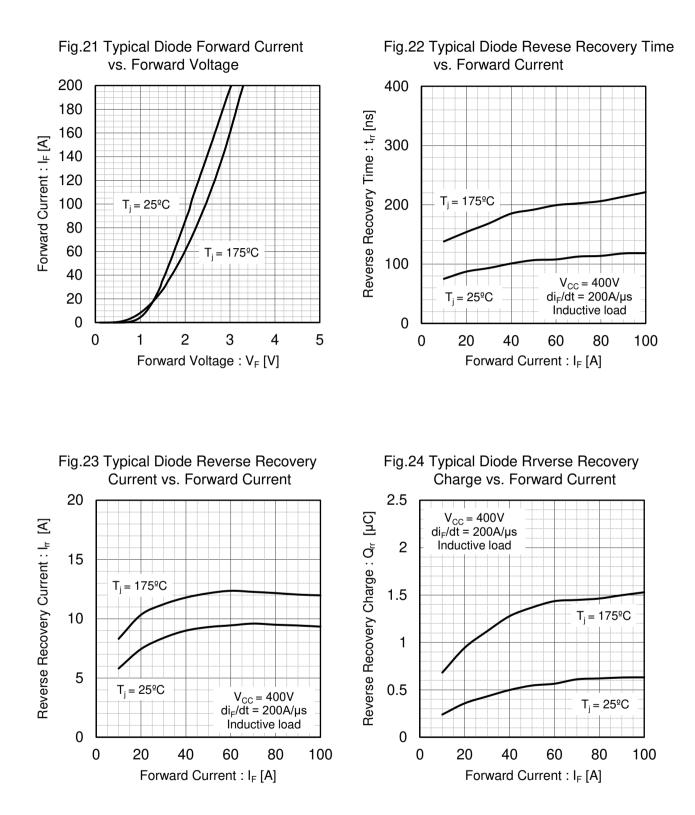


Fig.6 Typical Output Characteristics









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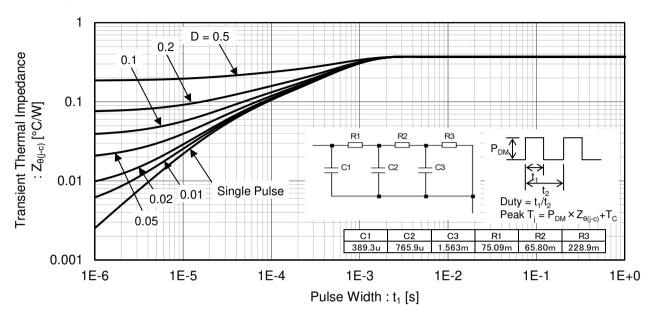
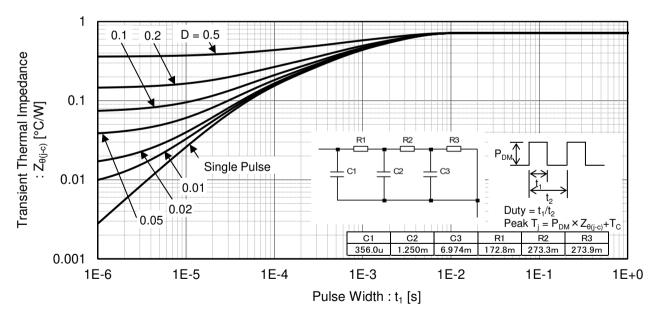


Fig.25 Typical IGBT Transient Thermal Impedance

Fig.26 Typical Diode Transient Thermal Impedance



Inductive Load Switching Circuit and Waveform

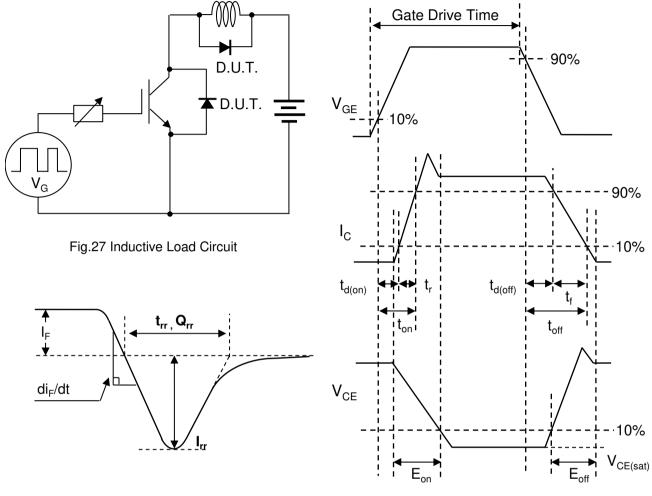


Fig.29 Diode Reverse Recovery Waveform

Fig.28 Inductive Load Waveform

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