Features
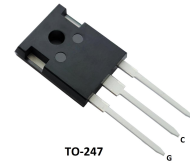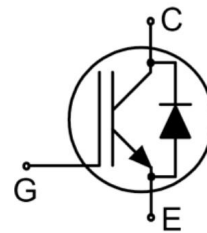
- Low gate charge
- FS Technology
- saturation voltage:
  VCE(sat), typ = 2.2V @
  IC = 15A and TC = 25°C
- RoHS product

TO-247

TO-263

Applications

- General purpose inverters
- Induction heating(IH)
- UPS

Absolute Ratings（Tc=25℃）

Parameter	Symbol		Value	Unit
Collector-Emmiter Voltage	V_{CES}		1200	V
*Collector Current-continuous	Ic T=25℃		30	A
	T=100℃		15	A
Collector Current-pulse(note 1)	I_{CM}		40	A
Diode Continuous forward current	I_F T=100℃		15	A
Diode Maximum Forward Current (Note 1)	I_{FM}		40	A
Gate-Emmiter Voltage	V_{GES}		±30	V
Power Dissipation(TO-247)	P_D T_C=25℃		125	W
Power Dissipation(TO-263)	P_D T_C=25℃		182	W
Operating Temperature Range	T_J		-55~+150	℃
Storage Temperature Range	T_{STG}		-55~+150	℃
Maximum Lead Temperature for Soldering Purposes	T_L		300	℃

*Collector current limited by maximum Junction temperature

Electrical Characteristic(TC=25℃ unless otherwise noted)

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Off-Characteristics						

Collector-Emmiter Voltage	BV_{CES}	I_C=500µA,V_{GE}=0V	1200	-	-	V
Zero Gate Voltage Collector Current	I_{CES}	V_{CE}=1200V,V_{GE}=0V, T_C=25℃	-	-	0.2	mA
		T_C=100℃	-	-	2	mA
Gate-body leakage current,reverse	I_{GESR}	V_{CE}=0V,V_{GE}=-20V	-	-	-100	nA
On-Characteristics						
Gate-Emmiter Threshold Voltage	$V_{GE(th)}$	VCE=VGE, lc=600uA	4.5	-	6.5	V
Short Collector Current [2]	I_{CSC}	V_{GE}=15V,V_{CE}=600V, Tsc<10µS,T_C=25℃	-	80	-	A
Collector-Emmiter saturation Voltage	V_{CESAT}	V_{GE}=15V,I_C=15A, T_C=25℃	-	2.2	2.5	V
		T_C=125℃	-	2.4	-	V
		T_C=150℃	-	2.5	-	V
Dynamic Characteristics						
Input capacitance	Cies	VCE=25V, VGE=0V, f=1.0MHZ,	-	1030	1800	pF
Output capacitance	Coes		-	80	120	pF
Reverse transfer capacitance	Cres		-	50	100	pF
Total Gate Charge	Qg	VCC=600V,IC=15A, VGE=15V [3,4]	-	70	-	nC
Switching Characteristics						
Turn-On delay time	t_d(on)	V_{CE}=600V,Ic=15A, R_G=10Ω,Inductive load Tc=25℃	-	80	-	ns
Turn-On rise time	t_r		-	65	-	ns
Turn-off delay time	t_d(off)		-	180	-	ns
Turn-off Fall time	t_f		-	80	-	ns
Turn-on energy	E_{on}		-	2.2	-	mJ
Turn-off energy	E_{off}		-	1.1	-	mJ
Total switching Energy	E_{tot}		-	3.2	-	mJ
Anti-Paraller Diode Characteristics and Maximum Ratings						
Diode Forward Voltage	V_F	V_{GE}=0V,I_F=15A.	-	1.8	2.9	V
Diode Reverse recovery time	t_{rr}	V_{GE}=0V,V_R=800V, I_F=15A	-	200	-	ns
Reverse recovery charge	Q_{rr}	dI_F/dt=750A/us [4]	-	1.1	-	µC

Thermal Characteristics

| Symbol	Parameter	Max		Units
		TO-247	TO-263	
$R_{th\,j-c}$	Thermal Resistance, Junction to case	2	0.82	℃/W
$R_{th\,j-a}$	Thermal Resistance, Junction to Ambient	48	62.5	℃/W

Notes:

1：Pulse width limited by maximum junction temperature

2：Allowed number of short circuits: <1000; time between short circuits: >1s.

3：Pulse Test：Pulse Width ≤300μs,Duty Cycle≤2％

4：Essentially independent of operating temperature

Order Message

Marking	Package
MSG15T120FPC	TO-247
MSG15T120FPE	TO-263

Electrical Characteristics(curves)

Stored Charge

Reverse Recovery Time
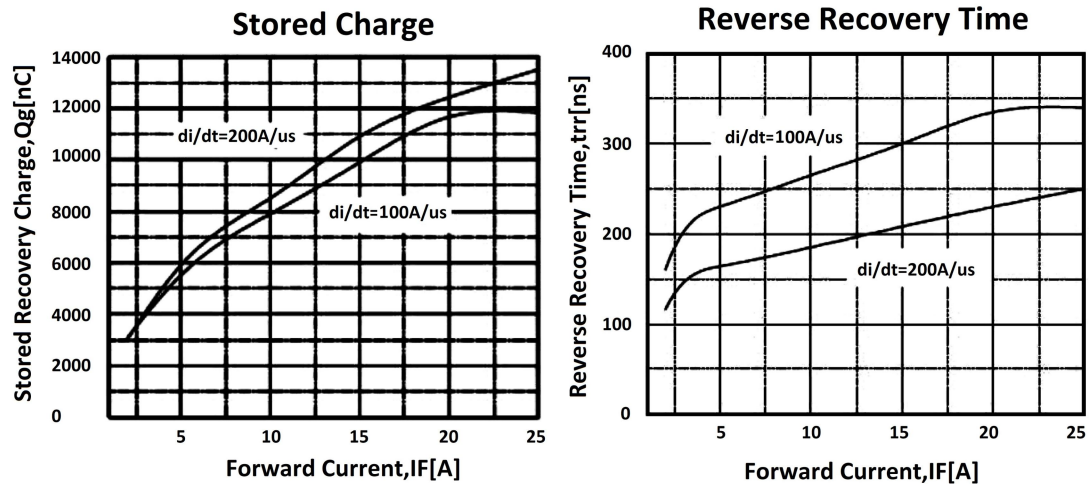
Typical Output Characteristics, Tj= 25 ℃
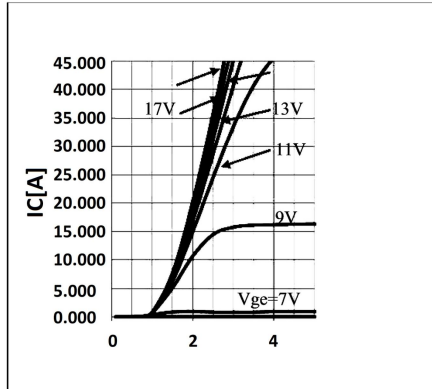
Typical Output Characteristics, Tj=150℃
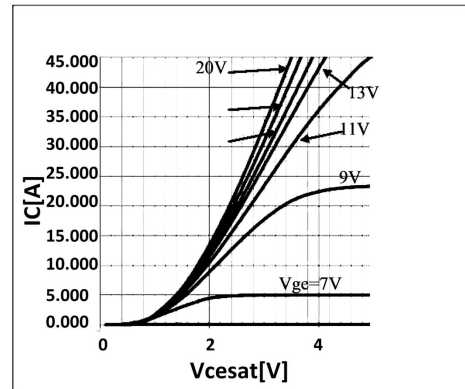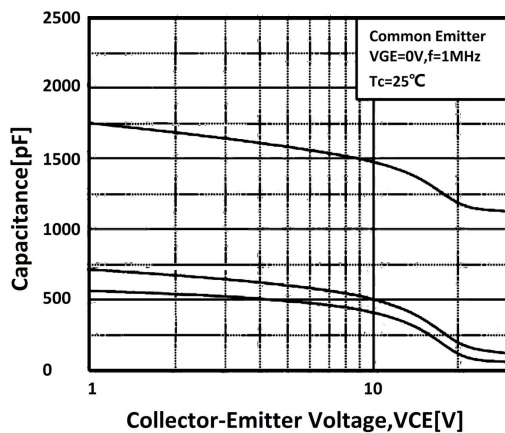

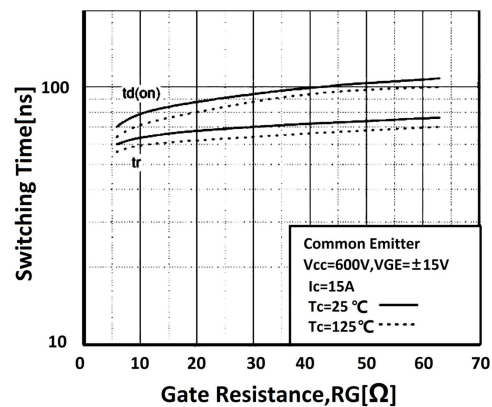### Typical Saturation Voltage Characteristics
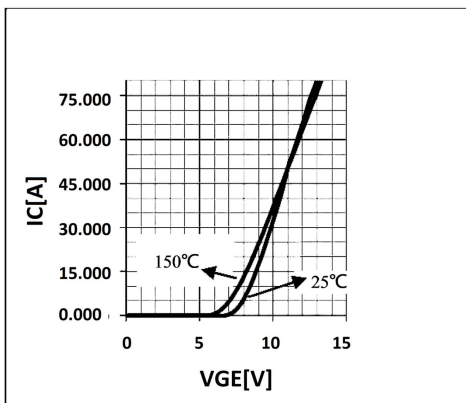
Saturation Voltage vs. Case Temperature at Vaiant Current Level
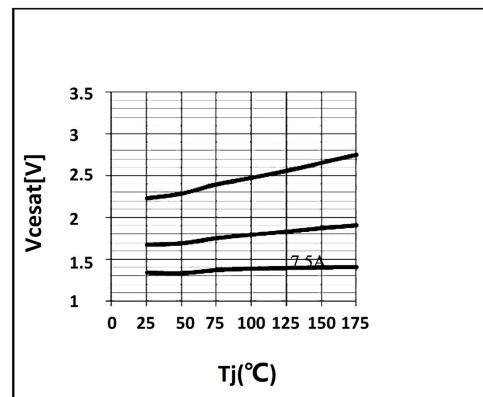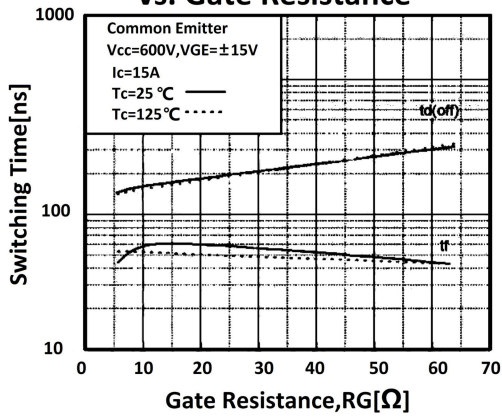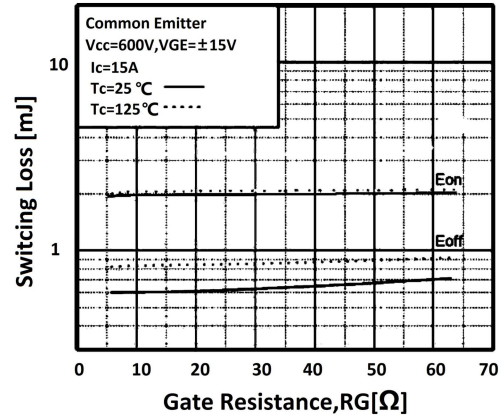

Capacitance Characteristics

Turn-On Characteristics vs. Gate Resistance
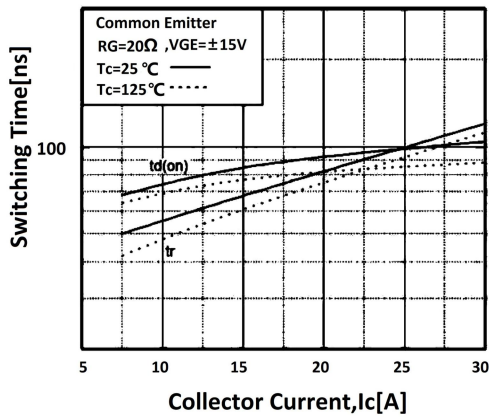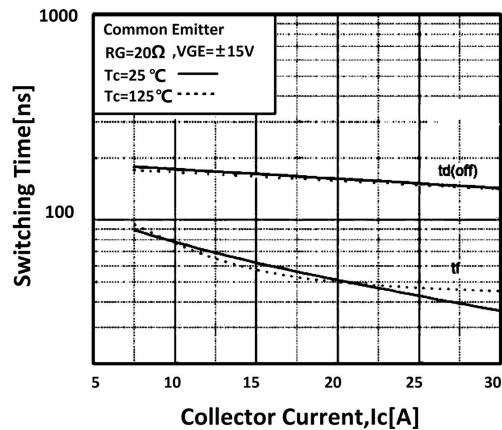
Turn-off Characteristics vs. Gate Resistance

Common Emitter
Vcc=600V,VGE=±15V
Ic=15A
Tc=25℃ ——
Tc=125℃ ·····

td(off)

tf

Switching Time[ns]

Gate Resistance,RG[Ω]

Switching Loss vs. Gate Resistance

Common Emitter
Vcc=600V,VGE=±15V
Ic=15A
Tc=25℃ ——
Tc=125℃ ·····

Eon

Eoff

Switcing Loss [mJ]

Gate Resistance,RG[Ω]

Turn-On Characteristics vs. Collector Current

Common Emitter
RG=20Ω ,VGE=±15V
Tc=25℃ ——
Tc=125℃ ·····

td(on)

tr

Switching Time[ns]

Collector Current,Ic[A]

Turn-off Characteristics vs. Collector Current

Common Emitter
RG=20Ω ,VGE=±15V
Tc=25℃ ——
Tc=125℃ ·····

td(off)

tf

Switching Time[ns]

Collector Current,Ic[A]

Switching Loss vs. Collector Current

Common Emitter
RG=20Ω ,VGE=±15V
Tc=25℃ ——
Tc=125℃ ·····

Eon

Eoff

Switcing Loss [mJ]

Collector Current,Ic[A]
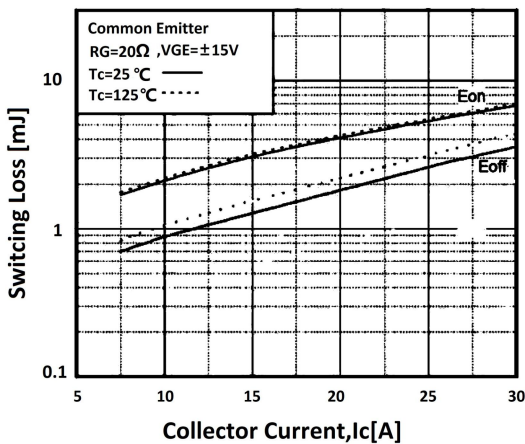
Gate Charge Characteristics

Common Emitter
RL=40Ω
Tc=25℃

600V

400V

Vcc = 200V

Gate Emitter Voltage,VGE[V]
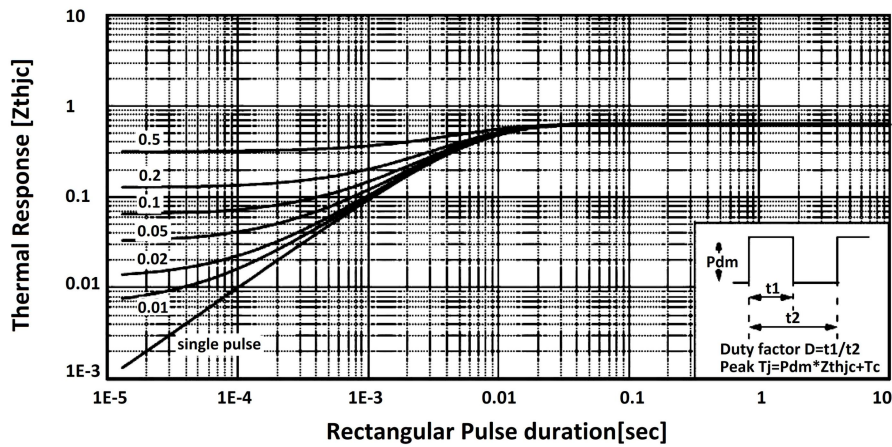
Gate Charge,Qg[nC]
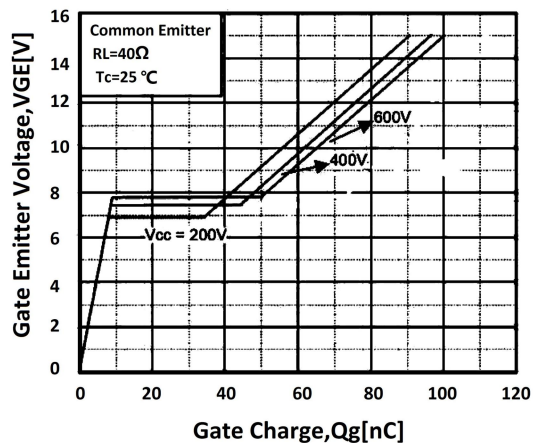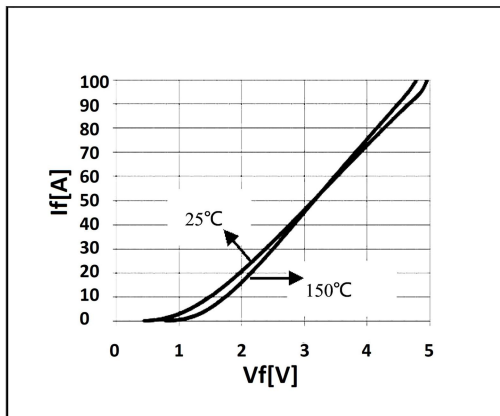
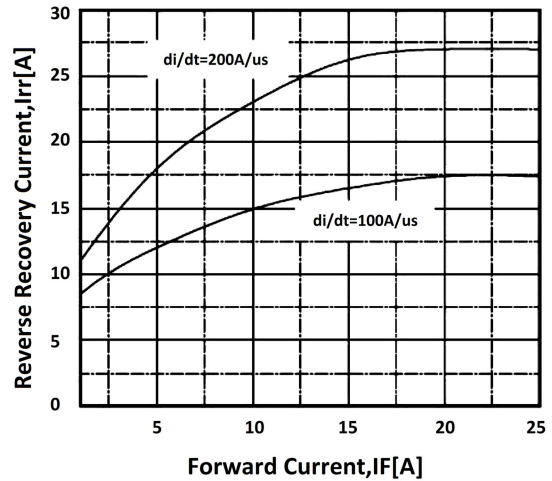## SOA Characteristics
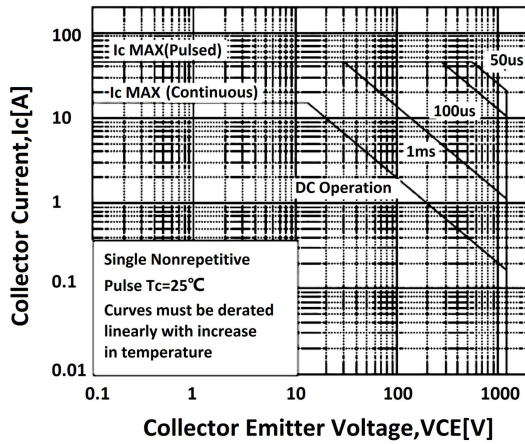
Turn-Off SOA
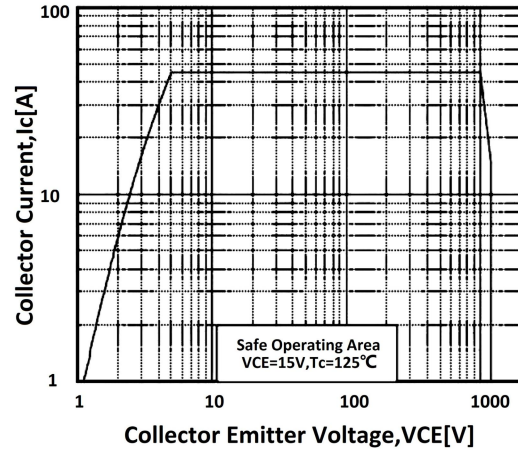
Transient Thermal Impedance

Forward Characteristics

Reverse Recovery Current

Package Mechanical DATA

TO-247

TO-263　Unit:mm