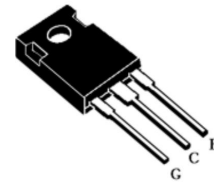


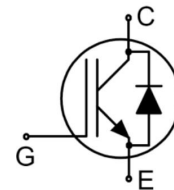
Features

- Low gate charge
- Trench FS Technology
- Saturation voltage: $V_{CE(sat), typ} = 1.6V$
@ $I_C = 50A$ and $T_C = 25^\circ C$



Applications

- General purpose inverter
- UPS



Absolute Ratings ($T_C = 25^\circ C$)

Parameter	Symbol	Value	Unit
		MSG50T65FQC	
Collector-Emmitter Voltage	V_{ce}	650	V
*Collector Current-continuous	I_C $T = 25^\circ C$ $T = 100^\circ C$	100	A
		50	A
Diode forward current	I_F $T_C = 25^\circ C$ $T_C = 100^\circ C$	100	A
		50	A
Collector Current-pulse (note 1)	I_{CM}	200	A
Gate-EMMiter Voltage	V_{GES}	± 20	V
Turn-off safe area	-	200	A
Power Dissipation	PD $T_C = 25^\circ C$	437	W
Operating and Storage Temperature Range	T_J, T_{STG}	$-55 \sim +150$	$^\circ C$
Maximum Lead Temperature for Soldering Purposes	T_L	300	$^\circ C$

*Collector current limited by maximum junction temperature

Electrical Characteristics

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Off-Characteristics						
Collector-Emmitter Voltage	BV_{CES}	$I_c=250\mu A, V_{GE}=0V$	650	-	-	V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{CES}/\Delta T_J$	$I_c=0.5mA$, referenced to 25°C	-	0.6	-	V/°C
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V, T_c=25^\circ C$	-	-	0.2	mA
Gate-body leakage current, forward	I_{GESF}	$V_{CE}=0V, V_{GE}=20V$	-	-	200	nA
Gate-body leakage current, reverse	I_{GESR}	$V_{CE}=0V, V_{GE}=-20V$	-	-	-200	nA
On-Characteristics						
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_c=250\mu A$	4.5	-	6.5	V
Collector-Emmitter saturation Voltage	V_{CESAT}	$V_{CE}=15V, I_c=50A, T_c=25^\circ C$	-	1.6	2.2	V
Short Collector current(Note 2)	$I_{C(SC)}$	$V_{GE}=15V, V_{CE}=300V, t_{sc}<10\mu s, T_c=25^\circ C$	-	295	-	A
Dynamic Characteristics						
Input capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=1.0MHz$	-	3435	-	pF
Output capacitance	C_{oes}		-	283	-	pF
Reverse transfer capacitance	C_{res}		-	79.8	-	pF

Electrical Characteristics

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Switching Characteristics						
Turn-on delay time	td(on)	$V_{CE}=400V, I_c=50A,$ $R_G=10\Omega, V_{GE}=15V,$ Parasitic ductance=75nH $T_c=25^\circ C$	-	35	-	ns
Turn-On rise time	tr		-	100	-	ns
Turn-Off delay time	td(off)		-	134	-	ns
Turn-Off Fall time	t _f		-	75	-	ns
Turn-on energy	E _{on}		-	1.55	-	mJ
Turn-off energy	E _{off}		-	0.63	-	mJ
Total switching energy	E _{total}		-	2.18	-	mJ
Turn-on delay time	td(on)	$V_{CE}=400V, I_c=50A,$ $R_G=10\Omega, V_{GE}=15V,$ Parasitic ductance=75nH $T_c=175^\circ C$	-	32	-	ns
Turn-On rise time	tr		-	93	-	ns
Turn-Off delay time	td(off)		-	161	-	ns
Turn-Off Fall time	t _f		-	159	-	ns
Turn-on energy	E _{on}		-	1.58	-	mJ
Turn-off energy	E _{off}		-	1.61	-	mJ
Total switching energy	E _{total}		-	3.19	-	mJ
Total Gate Charge	Q _g	$V_{CE}=520V,$ $I_c=50A$ $V_{GE}=15V,$ $T_c=25^\circ C$	-	121	-	nC
Gate to emitter charge	Q _{ge}		-	31.6	-	nC
Gate to collector charge	Q _{gc}		-	51.3	-	nC
Gate resistance	R _g		f=1 MHz, open collector	-	2.0	-
Anti-Parallel Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Voltage	V _F	$V_{GE}=0V, I_F=20A$	-	1.7	2.4	V
Diode Reverse recovery time	t _{rr}	$V_{GE}=0V, V_R=400V$ $I_F=50A$ $di/dt=200A/us$ (note 4) $T_c=25^\circ C$	-	20.2	-	ns
Reverse recovery charge	Q _{rr}		-	13.9	-	nC
Diode Reverse recovery Current	I _{RRM}		-	16.1	-	A

Diode Reverse recovery time	t_{rr}	$V_{GE}=0V, V_R=400V$ $I_F=50A$ $di/dt=200A/us$ (note 4) $T_C=175^\circ C$	-	128	-	ns
Reverse recovery charge	Q_{rr}		-	380	-	nC
Diode Reverse recovery Current	I_{RRM}		-	33	-	A

Thermal Characteristic

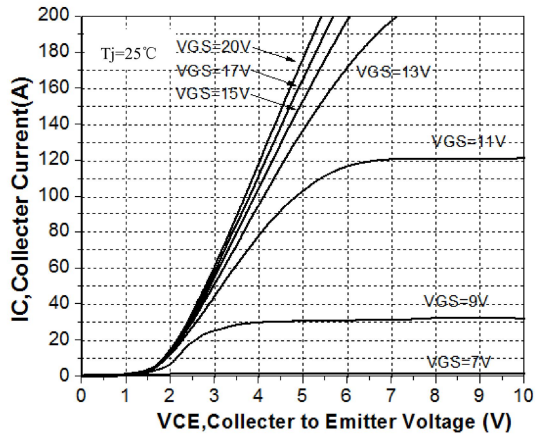
Paramer	Symbol	Max	Unit
Thermal Resistance,Junction to Case	$R_{th(j-c)}$	0.343	$^\circ C/W$
Thermal Resistance,Junction to Ambient	$R_{th(j-A)}$	34.72	$^\circ C/W$

Notes:

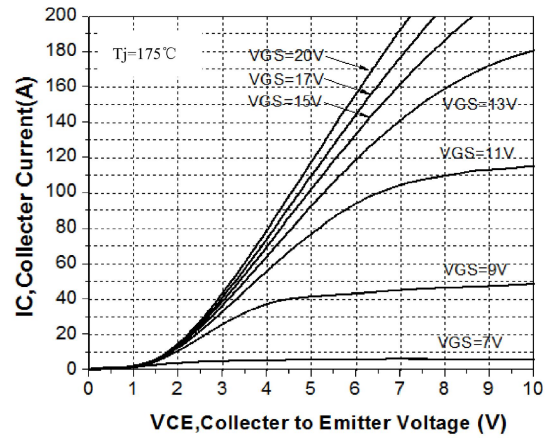
- 1: Pulse width limited by maximum junction temperature
- 2: Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$
- 3: Essentially independent of operating temperature

Electrical Characteristics (curves)

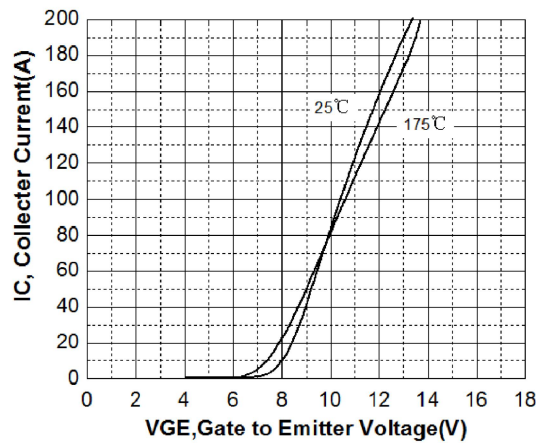
Output Characteristics (25°C)



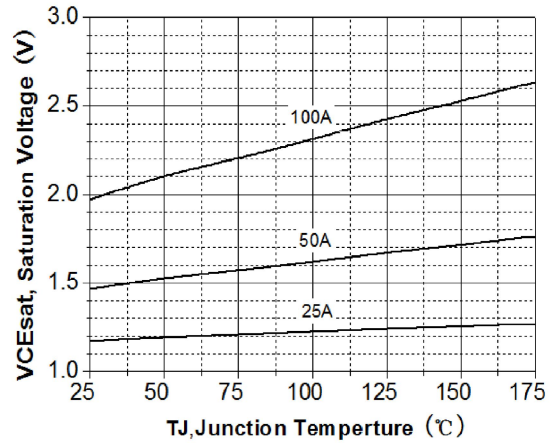
Output Characteristics (175°C)



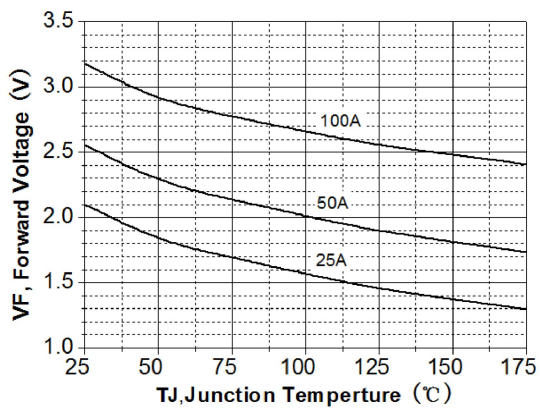
Transfer Characteristics



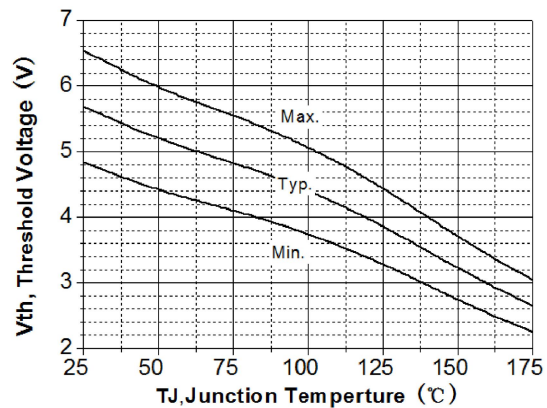
Vcesat vs. Tj



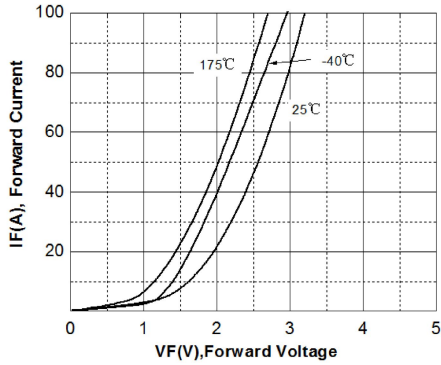
VF vs. Tj



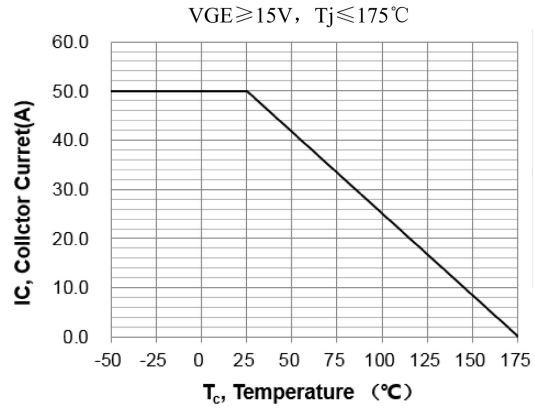
VTH vs. Tj



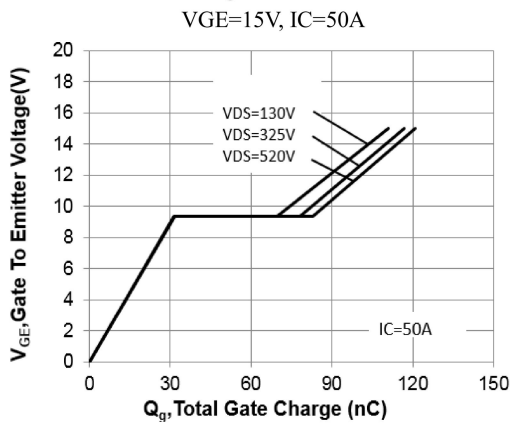
Diode Characteristic



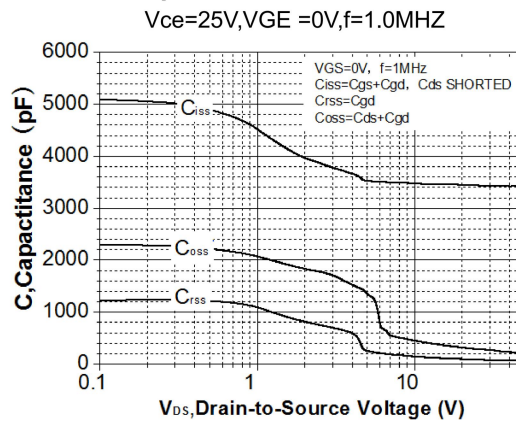
Collector current vs. case temperature



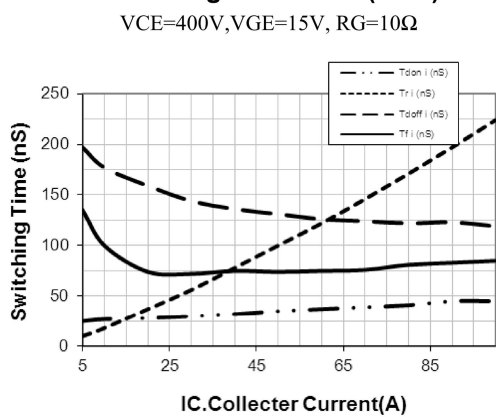
Gate Charge Characteristics



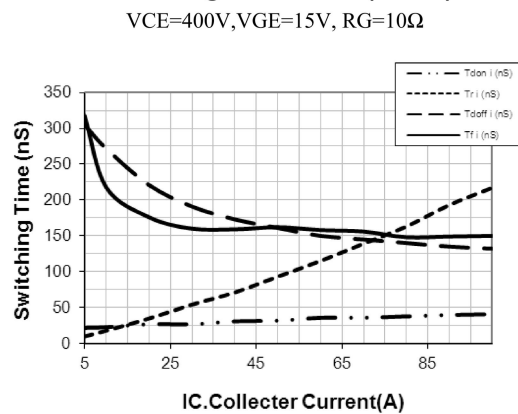
Capacitance Characteristic

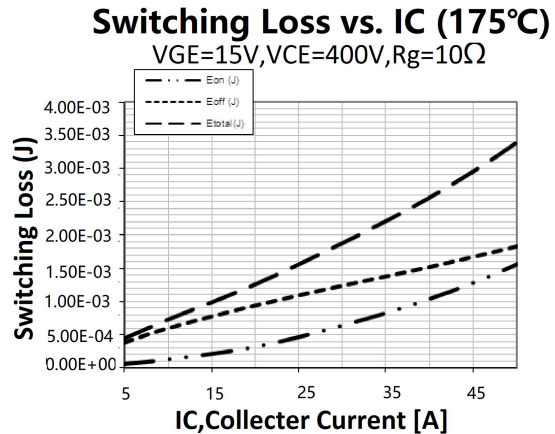
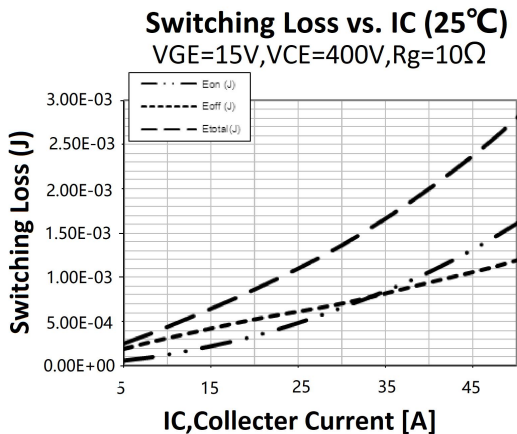
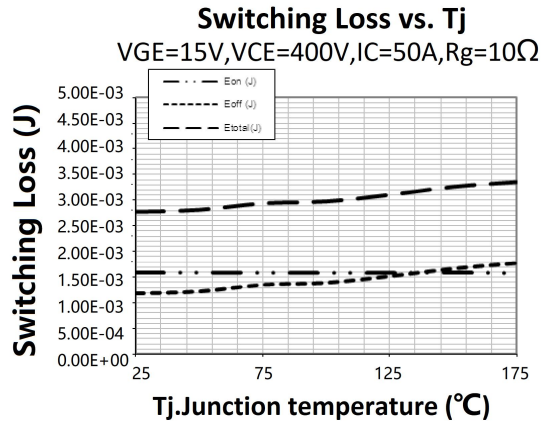
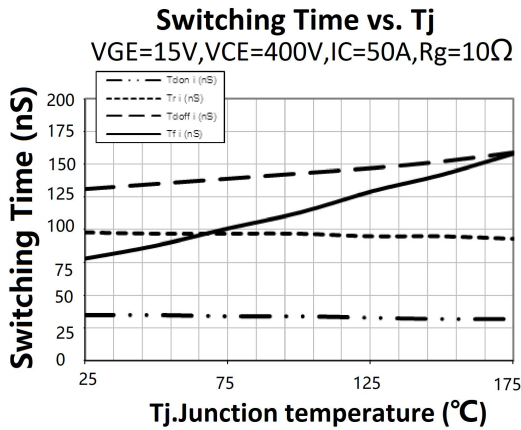
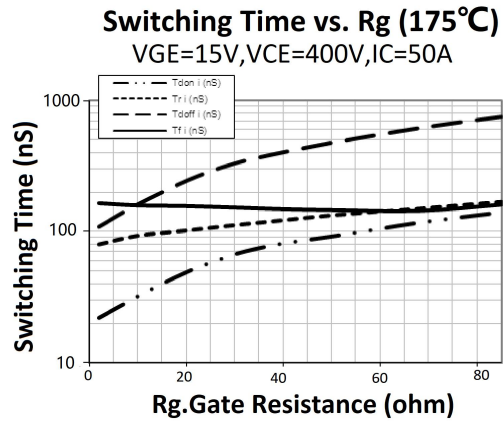
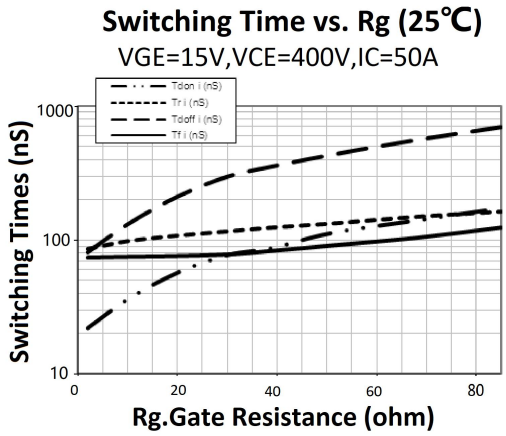


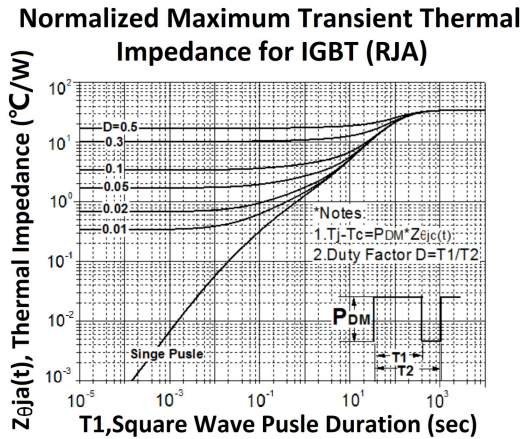
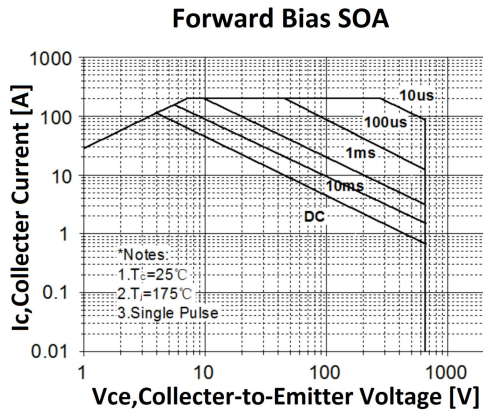
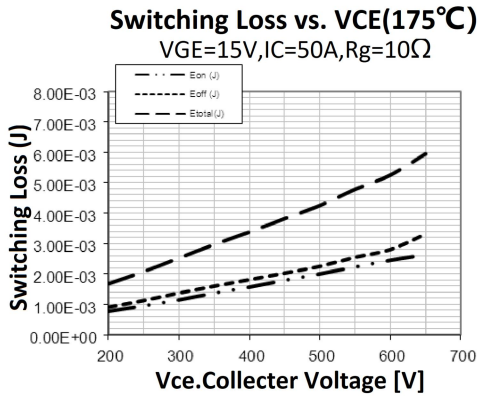
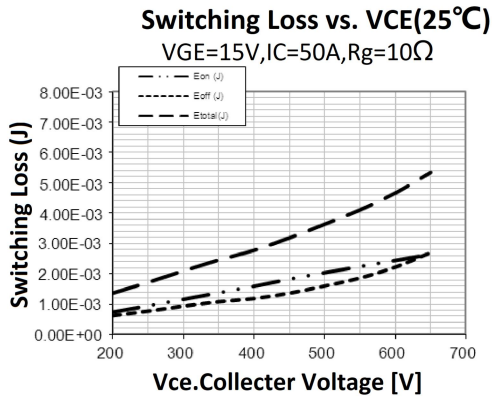
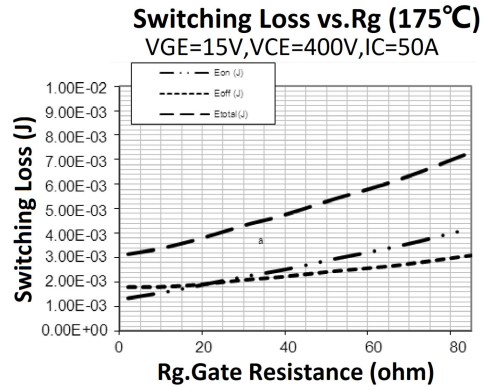
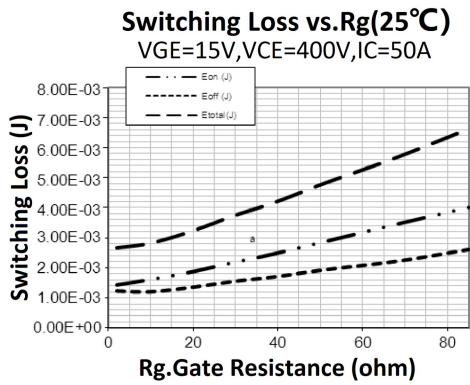
Switching Time vs. IC(25°C)



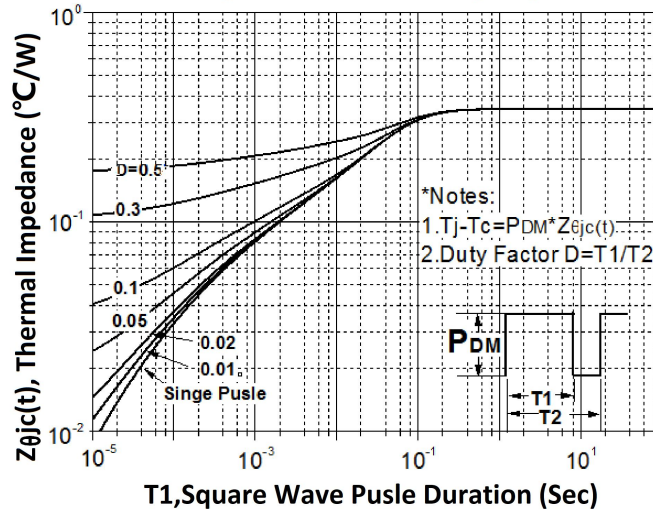
Switching Time vs. IC(175°C)







Normalized Maximum Thermal Impedance for IGBT (RJC)



Package Mechanical DATA

