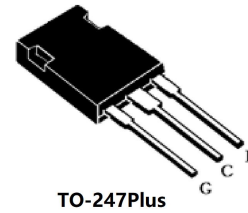


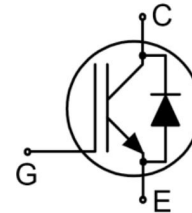
### Features

- Very Low Saturation Voltage:  
VCE(sat) = 1.8V @ IC = 120 A
- Maximum Junction Temperature: TJ = 175°C
- Positive Temperature Co-Efficient
- Tight Parameter Distribution
- High Input Impedance



### Applications

- Traction Inverter for HEV/EV
- Auxiliary DC/AC Converter
- Motor Drives
- Other Power-Train Applications Requiring High Power Switch



### Absolute Ratings(Tc=25°C)

Parameter	Symbol	Value	Unit
Collector-Emmitter Voltage	V <sub>ces</sub>	650	V
Collector Current-continuous	I <sub>c</sub> T=25°C	240	A
	T=100°C	120	A
Diode forward current	I <sub>F</sub> T=25°C	240	A
	T <sub>C</sub> =100°C	120	A
Collector Current-pulse (note 1)	I <sub>CM</sub>	378	A
Gate-EMMiter Voltage	V <sub>GES</sub>	±30	V
Power Dissipation	PD T <sub>C</sub> =25°C	882	W
	T <sub>C</sub> =100°C	441	W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55~+175	°C
Short Circuit Withstand Time	t <sub>sc</sub>	5	us
Maximum Lead Temperature for Soldering Purposes	T <sub>L</sub>	300	°C

### Electrical Characteristics

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
<b>Off-Characteristics</b>						
Collector-Emmitter Voltage	BV <sub>CES</sub>	I <sub>c</sub> =1mA, V <sub>GE</sub> =0V	650	-	-	V

Zero Gate Voltage Collector Current	$I_{CES}$	$V_{CE}=650V, V_{GE}=0V, T_C=25^{\circ}C$	-	-	40	$\mu A$
Gate-body leakage current, forward	$I_{GESF}$	$V_{CE}=0V, V_{GE}=30V$	-	-	250	nA
Gate-body leakage current, reverse	$I_{GESR}$	$V_{CE}=0V, V_{GE}=-30V$	-	-	-250	nA
<b>On-Characteristics</b>						
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=0.6mA$	3.5	5.0	6.5	V
Collector-Emmitter saturation Voltage	$V_{CESAT}$	$V_{GE}=15V, I_C=120A$	-	-	1.8	V
<b>Dynamic Characteristics</b>						
Input capacitance	$C_{ies}$	$V_{CE}=30V, V_{GE}=0V, f=1.0MHz$	-	5764	-	pF
Output capacitance	$C_{oes}$		-	495	-	pF
Reverse transfer capacitance	$C_{res}$		-	115	-	pF

## Electrical Characteristics

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
<b>Switching Characteristics</b>						
Turn-on delay time	$t_{d(on)}$	$V_{CC}=400V, I_C=120A, R_G=5\Omega, V_{GE}=15V, \text{Inductive Load}$ $T_C=25^{\circ}C$	-	53	-	ns
Turn-On rise time	$t_r$		-	134	-	ns
Turn-Off delay time	$t_{d(off)}$		-	102	-	ns
Turn-Off Fall time	$t_f$		-	115	-	ns
Turn-on Loss	$E_{on}$		-	6.8	-	mJ
Turn-off Loss	$E_{off}$		-	3.5	-	mJ
Total Loss	$E_{ts}$		-	10.3	-	mJ
Turn-on delay time	$t_{d(on)}$	$V_{CC}=400V, I_C=120A, R_G=5\Omega, V_{GE}=15V, \text{Inductive Load}$ $T_C=175^{\circ}C$	-	50	-	ns
Turn-On rise time	$t_r$		-	133	-	ns
Turn-Off delay time	$t_{d(off)}$		-	109	-	ns
Turn-Off Fall time	$t_f$		-	138	-	ns
Turn-on switching Loss	$E_{on}$		-	9.8	-	mJ
Turn-off switching Loss	$E_{off}$		-	4.0	-	mJ
Total switching Loss	$E_{ts}$		-	13.8	-	mJ
Gate Charge	$Q_g$		-	181	-	nC

Gate to Emitter Charge	Q <sub>ge</sub>	V <sub>CC</sub> =400V, I <sub>c</sub> =120A V <sub>GE</sub> =15V	-	49	-	nC
Gate to Collector Charge	Q <sub>gc</sub>		-	74	-	nC
<b>Anti-Parallel Diode Characteristics and Maximum Ratings</b>						
Drain-Source Diode Forward Voltage	V <sub>F</sub>	I <sub>F</sub> =120A	-	1.7	-	V
Diode Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> =160A di <sub>F</sub> =/dt=200A/us T <sub>J</sub> =25°C	-	123	-	ns
Diode Reverse recovery charge	Q <sub>rr</sub>		-	2.8	-	μC

### Thermal Characteristic

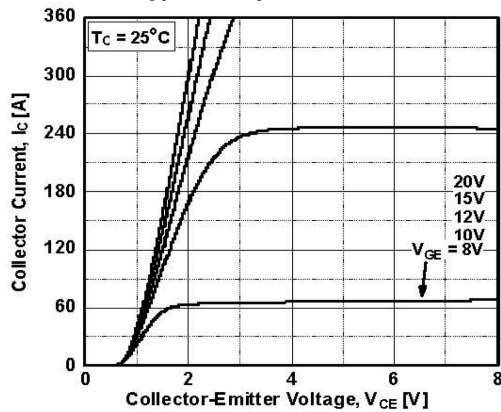
Paramer	Symbol	Max	Unit
Thermal Resistance, Junction to Case (IGBT)	R <sub>th(j-c)</sub>	0.17	°C/W
Thermal Resistance, Junction to Case (Diode)	R <sub>th(j-c)</sub>	0.32	°C/W
Thermal Resistance, Junction to Ambient	R <sub>th(j-A)</sub>	40	°C/W

#### Notes:

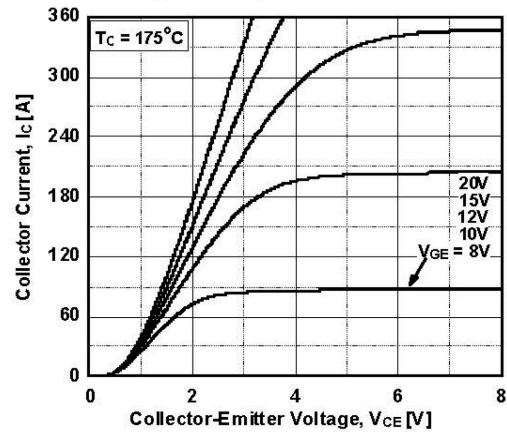
1. Repetitive Rating: Pulse width limited by maximum junction temperature

### Electrical Characteristics (curves)

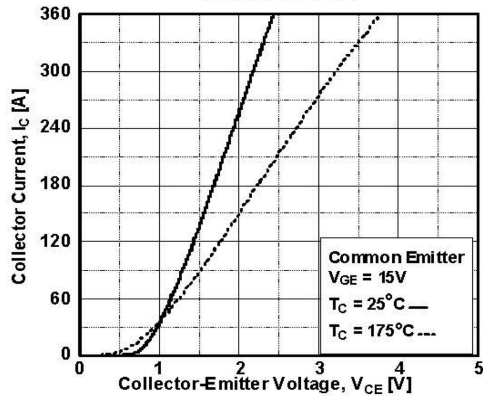
Typical Output Characteristics



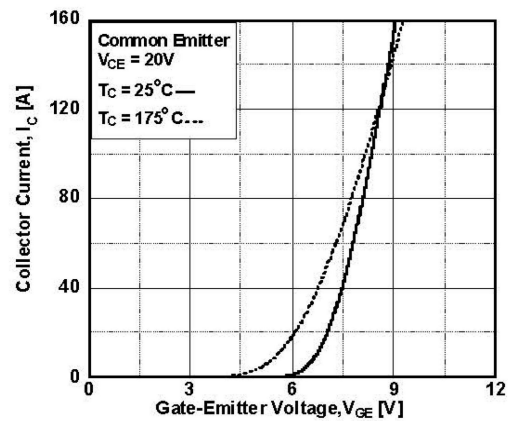
Typical Output Characteristics



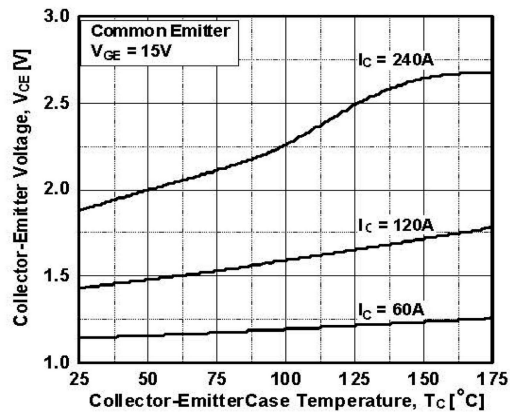
Typical Saturation Voltage Characteristics



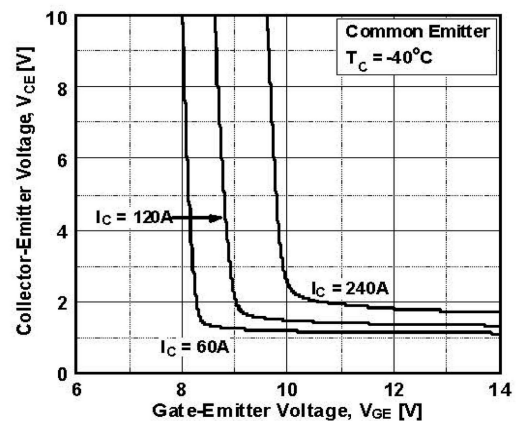
Transfer Characteristics

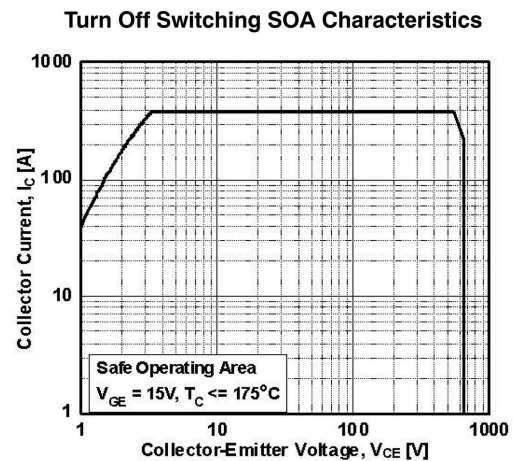
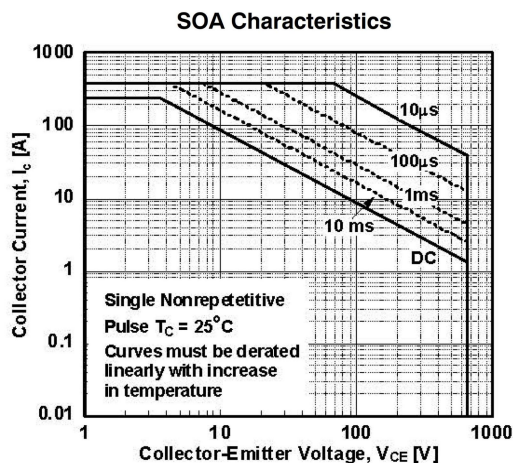
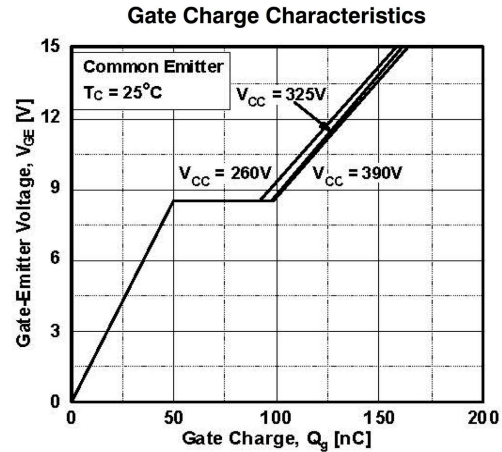
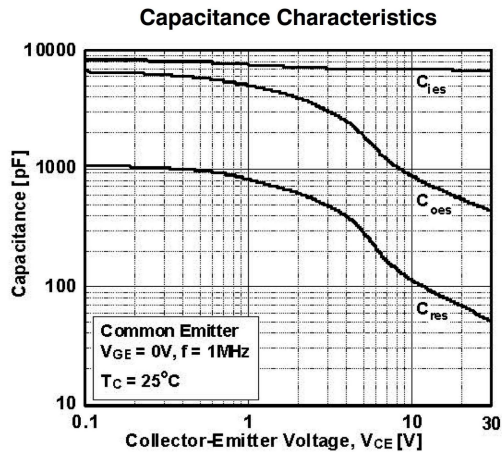
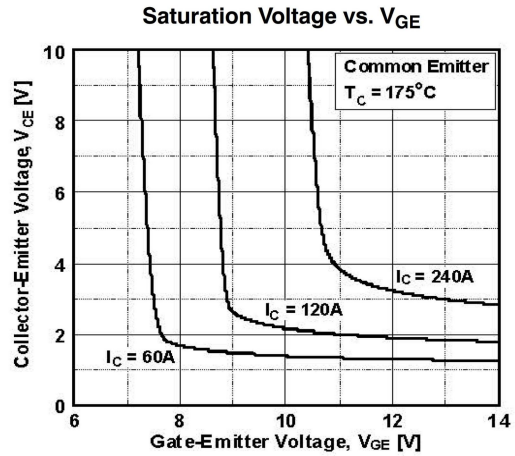
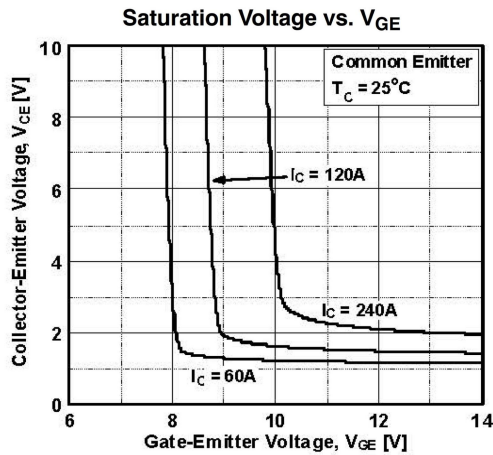


Saturation Voltage vs. Case Temperature at Variant Current Level

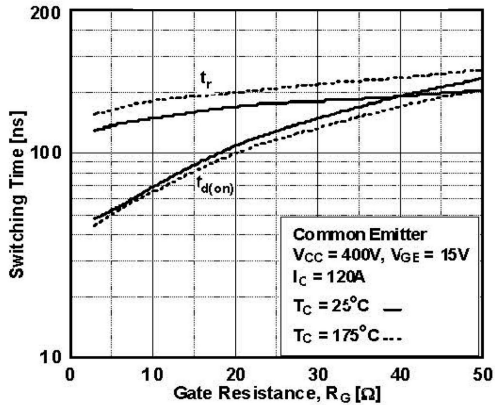


Saturation Voltage vs.  $V_{GE}$

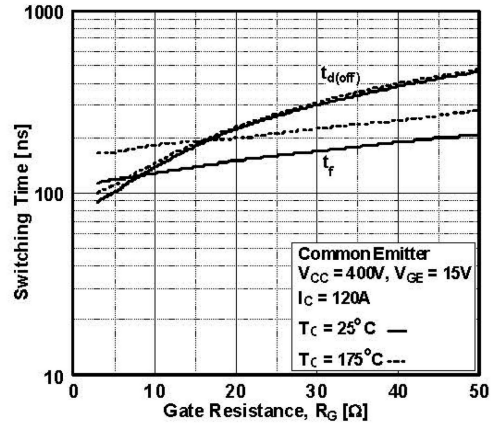




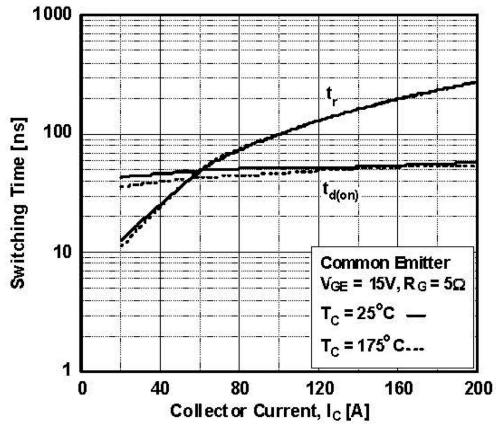
Turn-on Characteristics vs. Gate Resistance



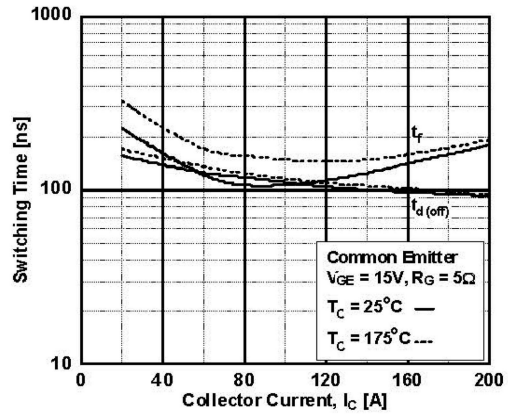
Turn-off Characteristics vs. Gate Resistance



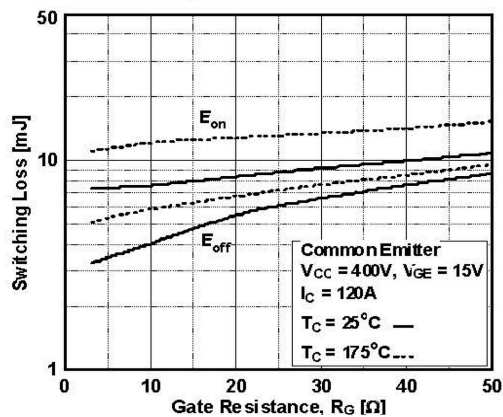
Turn-on Characteristics vs. Collector Current



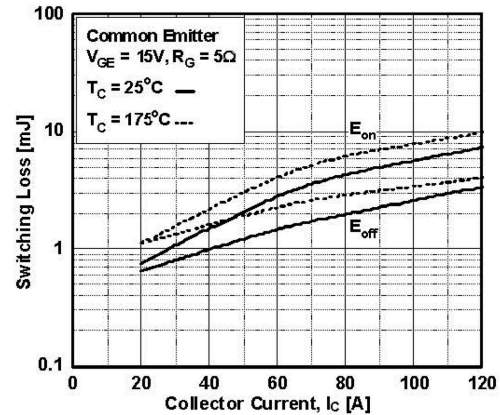
Turn-off Characteristics vs. Collector Current



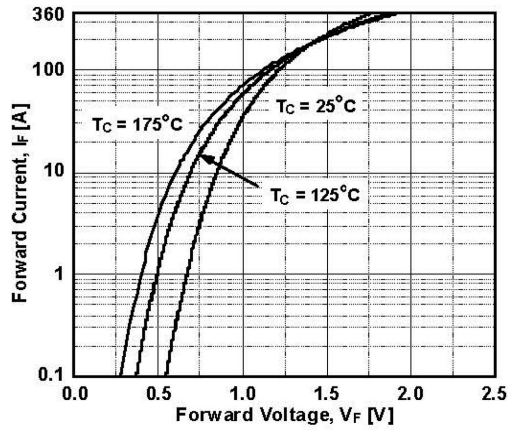
Switching Loss vs. Gate Resistance



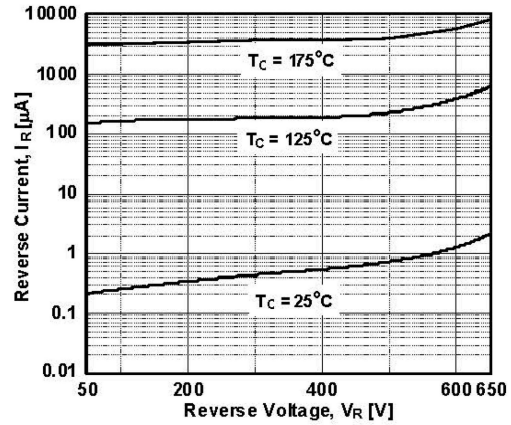
Switching Loss vs. Collector Current



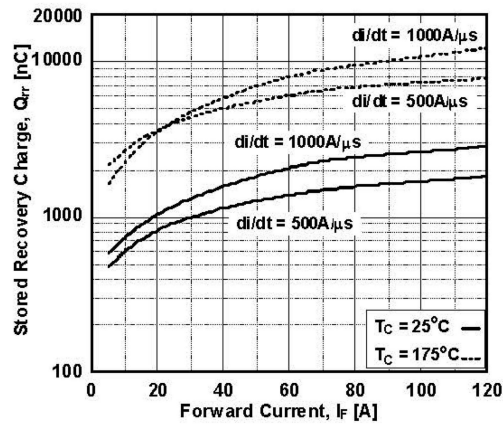
**Forward Characteristics**



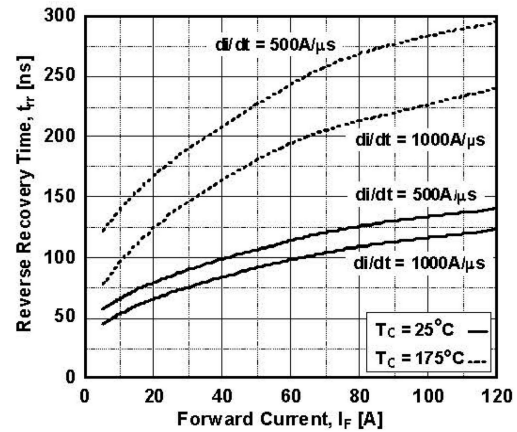
**Reverse Current**



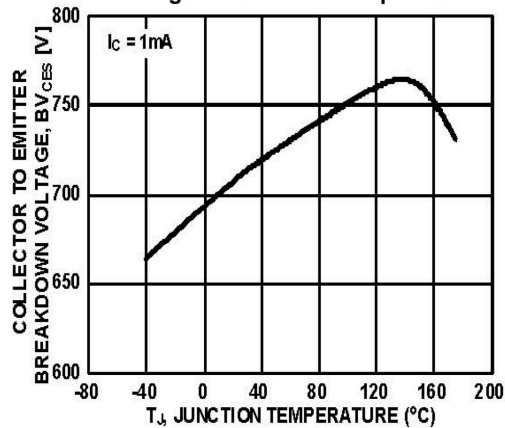
**Stored Charge**

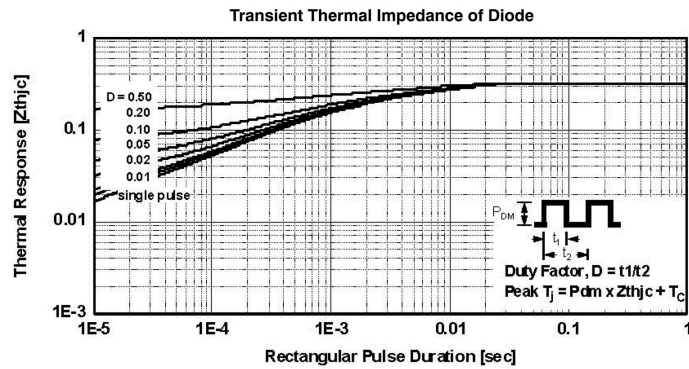
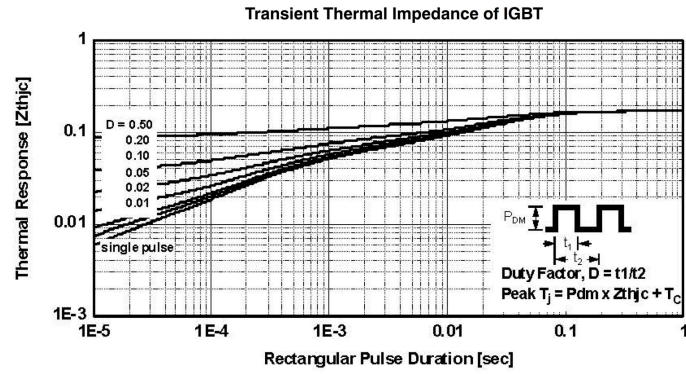


**Reverse Recovery Time**



**Collector to Emitter Breakdown Voltage vs. Junction Temperature**





### Package Mechanical DATA

