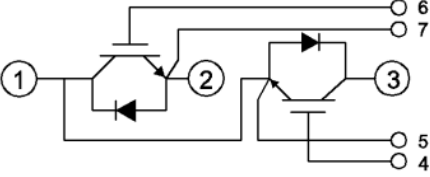



# NP150R12K2S

## NPT & The Third Generation Technology 1200V IGBT Module

<p><b>Features</b></p> <ul style="list-style-type: none"> <li>• <math>BV_{CES}=1200V</math></li> <li>• Low Conduction Loss: <math>V_{CE(sat)} = 2.9 V @ I_C=150A</math></li> <li>• Fast &amp; Soft Anti-Parallel FWD</li> <li>• Short Circuit rated: 10us at <math>T_C=100^\circ C</math></li> <li>• Isolation Type Package</li> </ul>	 <p>Equivalent Circuit</p>
<p><b>Applications</b></p> <ul style="list-style-type: none"> <li>• Induction Heating, Motor Drives, High Power Inverters</li> <li>• Welding Machine, UPS</li> </ul> <p><b>Description</b></p> <p>The IGBT Module 7SM-3 package devices are optimized to reduce losses and switching noise in high frequency power conditioning electrical systems.</p> <p>These IGBT Module series are ideally suited for IH ,High Power inverters, Motors drives and other applications where switching losses are significant portion of the total losses.</p>	 <p>package</p>

### Absolute Maximum Ratings (at $T_C=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Ratings	Unit	
$V_{CES}$	Collector to Emitter Voltage	1200	V	
$V_{GES}$	Gate to Emitter Voltage	$\pm 20$	V	
$I_C$	Collector Current	$T_C=25^\circ C$	200	A
		$T_C=100^\circ C$	150	A
$I_{CM}$	Pulsed Collector Current , $tp=1ms$	300	A	
$I_F$	Diode Continuous Forward Current	$T_C=100^\circ C$	150	A
$I_{FM}$	Diode Maximum Forward Current		300	A
$P_D$	Maximum Power Dissipation	$T_C=25^\circ C$	833	W
$T_J$	Operating Junction Temperature Range		-55~+150	$^\circ C$
$T_{STG}$	Storage Temperature Range		-55~+125	$^\circ C$
$V_{iso}$	Isolation Voltage	AC 1minute	2500	V
	Mounting screw Torque: M6		4	N.M
	Weight		300	g

### Thermal Characteristics

Symbol	Parameter	Ratings	Unit
$R_{th(J-C)}$ (IGBT)	Thermal Resistance, Junction to case for IGBT	0.15	$^\circ C/W$
$R_{th(J-C)}$ (Diode)	Thermal Resistance, Junction to case for Diode	0.3	$^\circ C/W$
$R_{th(C-A)}$	Thermal Resistance, Case to Ambient	0.05	$^\circ C/W$

### Electrical Characteristics of IGBT @ $T_C=25\text{ }^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{CES}$	Collector to Emitter Breakdown Voltage	$V_{GE}=0V, I_C=1mA$	1200	-	-	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=150A, V_{GE}=15V$	-	2.9	3.5	V
		$I_C=150A, V_{GE}=15V, T_C=100^\circ\text{C}$	-	3.6	-	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{CE}=V_{GE}, I_C=2mA$	4.5	-	7.5	V
$I_{CES}$	Zero Gate Voltage Collector Current	$V_{CE}=V_{CES}, V_{GE}=0V$	-	-	1	mA
$I_{GES}$	Gate to Emitter Leakage Current	$V_{GE}=V_{GES}, V_{CE}=0V$	-	-	$\pm 300$	nA

### Electrical Characteristics of Diode @ $T_C=25\text{ }^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_F$	Diode Forward Voltage	$I_F=150A$	-	3.0	3.6	V
		$I_F=150A, T_C=100^\circ\text{C}$	-	2.3	-	V
$t_{rr}$	Diode Reverse Recovery Time	$I_F=150A, di/dt=-200A/\mu s$	-	120	-	ns
$I_{rr}$	Diode Peak Reverse Recovery Current		-	12	-	A
$Q_{rr}$	Diode Reverse Recovery Charge		-	300	-	nC
$t_{rr}$	Diode Reverse Recovery Time	$I_F=150A, di/dt=-200A/\mu s, T_C=100^\circ\text{C}$	-	260	-	ns
$I_{rr}$	Diode Peak Reverse Recovery Current		-	20	-	A
$Q_{rr}$	Diode Reverse Recovery Charge		-	1900	-	nC

### Switching Characteristics @ $T_C=25\text{ }^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$I_C=150A, V_{CC}=600V, V_{GE}=\pm 15V, R_G=10\Omega, \text{Inductive Load}$	-	150	-	ns
$t_r$	Turn-on Rise Time		-	70	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	310	-	ns
$t_f$	Turn-off Fall Time		-	65	-	ns
$E_{on}$	Turn-on Switching Loss		-	6.7	-	mJ
$E_{off}$	Turn-off Switching Loss		-	9.0	-	mJ
$E_{ts}$	Total Switching Loss		-	15.7	-	mJ
$C_{ies}$	Input Capacitance	$V_{GE}=0V, V_{CE}=30V, f=1.0MHz$	-	6800	-	pF
$C_{res}$	Reverse Transfer Capacitance		-	740	-	pF
$C_{oes}$	Output Capacitance		-	250	-	pF
$Q_g$	Total Gate Charge	$I_C=150A, V_{CC}=600V, V_{GE}=\pm 15V$	-	580	-	nC
$Q_{ge}$	Gate to Emitter Charge		-	90	-	nC
$Q_{gc}$	Gate to Collector Charge		-	360	-	nC
$t_{sc}$	Short Circuit Withstand Time	$V_{CC}=600V, V_{GE}=\pm 15V, R_G=10\Omega @T_C=100^\circ\text{C}$	10	-	-	us

## Typical Performance Characteristics

Fig. 1. Typical Output Characteristics

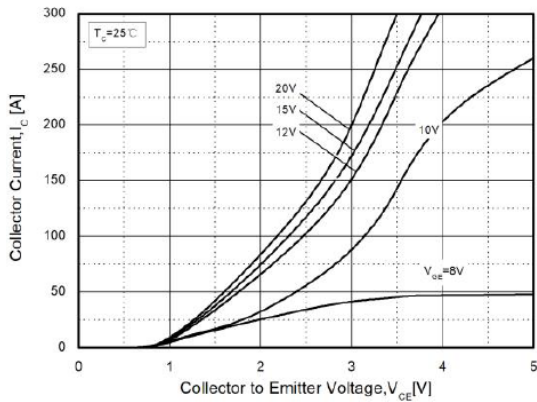


Fig. 2. Typical Output Characteristics

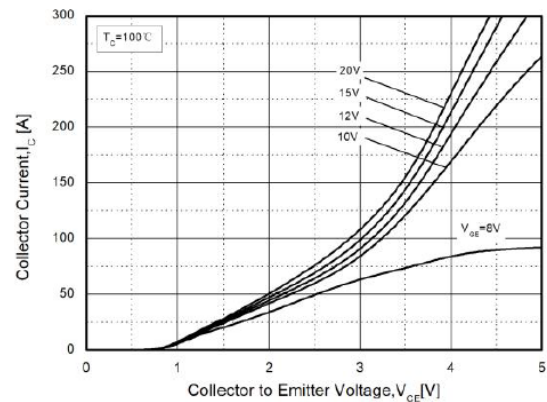


Fig. 3. Typical Saturation Voltage Characteristics

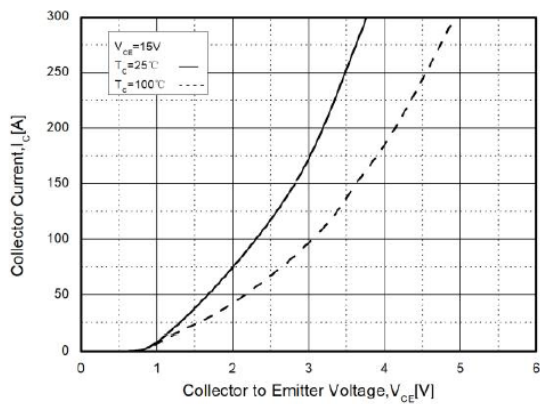


Fig. 4. Gate Charge Characteristics

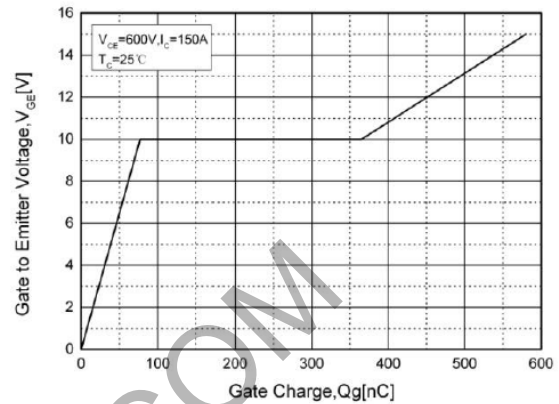


Fig. 5. Turn-on Characteristics vs.  $R_G$

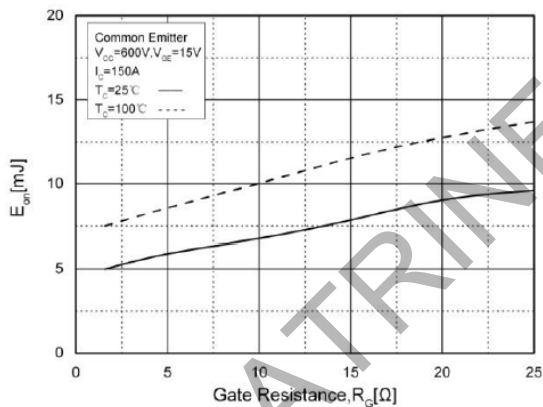
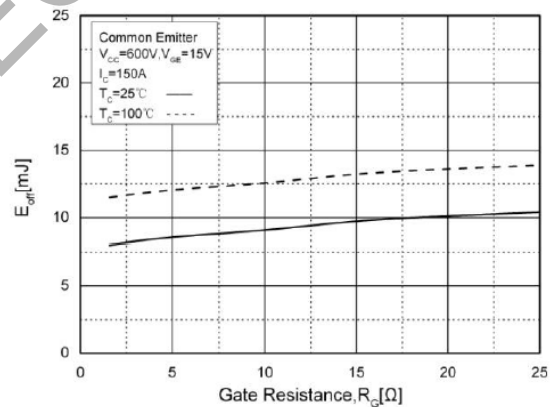


Fig. 6. Turn-off Characteristics vs.  $R_G$



## Typical Performance Characteristics

Fig. 7. Rate Current vs.  $T_c$

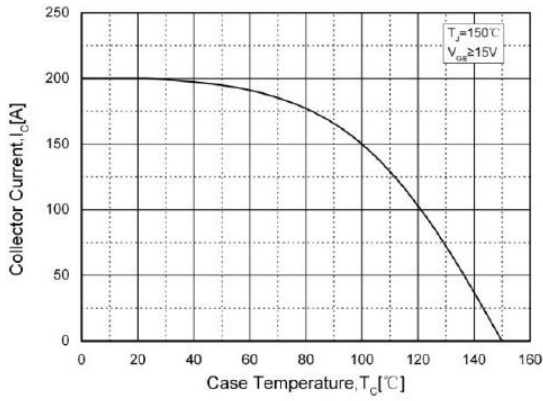


Fig. 8. Power Dissipation vs.  $T_c$

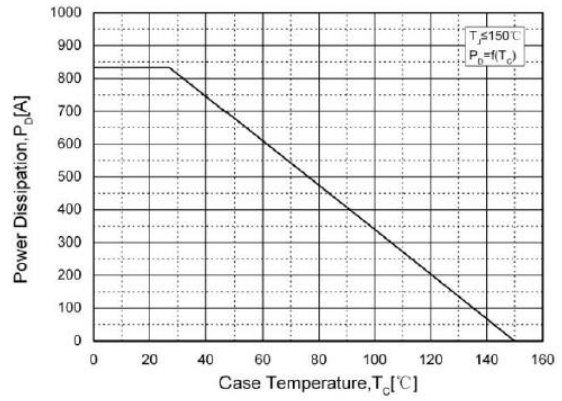


Fig. 9. Transient Thermal Impedance

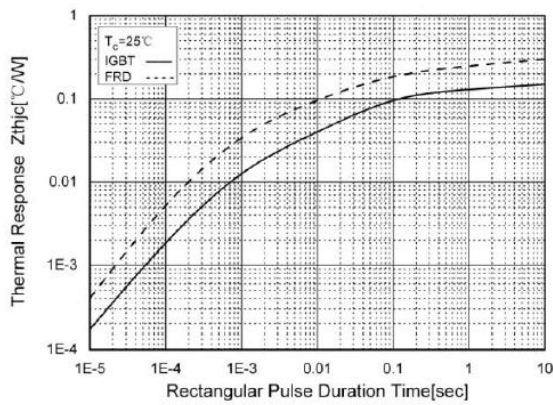
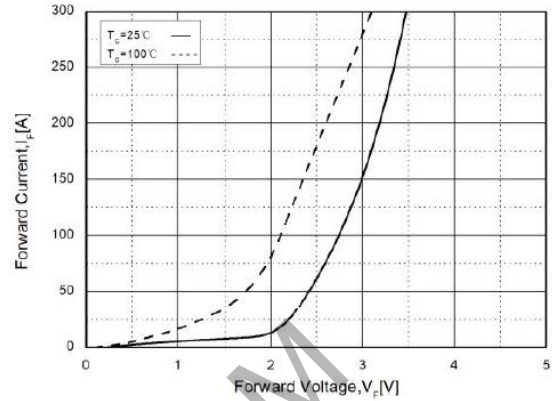
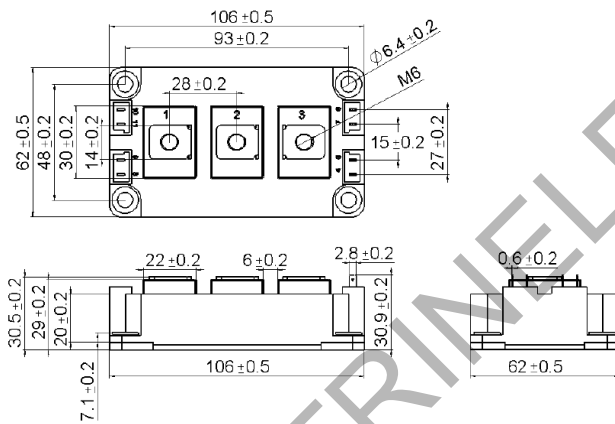


Fig. 10. Forward Characteristics



(Dimensions in Millimeters)



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