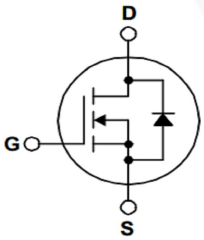
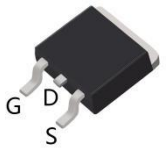
Thunder High Power Products

Silicon N-Channel Super Junction Power MOSFET

Description

The TH65R120DN utilizes the latest Super Junction processing techniques to achieve low on-resistance per silicon area. Additional features of this MOSFET are 150℃ operating junction temperature and high repetitive peak current capability. These features combine to make this MOSFET a highly efficient, robust and reliable device. It can be used in a wide variety of applications.





TO-263

General Features

- V_{DS}=650V,I_D=32A
- Low ON Resistance,$R_{DS(ON).max}$=120mΩ@V_{GS}=10V,I_D=14A
- Low reverse transfer capacitance
- Low Qg for fast response
- Short fall & rise times for fast switching
- 100% single pulse avalanche energy Test

Application

- Power switching application
- Digital amplifier
- Adapter and charger

Product Summary

V_{DS}	650V
$R_{DS(on).max}$	120mΩ
I_D	32A

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	650	V
Continuous drain current T_C = 25°C (Silicon limit)	I_D	32	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	I_{DM}	96	A
Avalanche energy, single pulse (L=10mH, Rg=25Ω)	E_{AS}	605	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_D	277.8	W
Operating junction and storage temperature	T_j, T_{stg}	-55...+150	°C

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case.	R_{thJC}	0.45	℃/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	57	

Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristic						
Drain-source breakdown voltage	BV_{DSS}	650	-	-	V	V_{GS}=0V, I_D=250uA
Gate threshold voltage	$V_{GS(th)}$	3.0	3.9	5.0	V	V_{DS}=V_{GS}, I_D=250uA
Zero gate voltage drain current	I_{DSS}	-	-	3	μA	V_{DS}=650V, V_{GS}=0V T_j=25℃
Gate-source leakage current	I_{GSS}	-	-	±100	nA	V_{GS}=±30V, V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	0.105	0.120	Ω	V_{GS}=10V, I_D=14A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	2657	-	pF	V_{GS}=0V, V_{DS}=100V, f=10kHz
Output Capacitance	C_{oss}	-	89	-		
Reverse Transfer Capacitance	C_{rss}	-	2	-		
Gate-Source charge	Q_{gs}	-	15	-	nC	V_{DD}=400V, I_D=19A V_{GS}=0 to 10V
Gate-Drain charge	Q_{gd}	-	20.2	-		
Gate Total Charge	Q_g	-	55.4	-		
Turn-on delay time	$t_{d(on)}$	-	29.6	-	ns	V_{DD}=400V, V_{GS}=10V, I_D=19A, R_G=2Ω
Rise time	t_r	-	31.3	-		
Turn-off delay time	$t_{d(off)}$	-	94.6	-		
Fall time	t_f	-	9.1	-		
Gate resistance	R_G	-	12.6	-	Ω	f=1MHz,open drain

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	0.67	-	V	V_{GS}=0V, I_F=1A
Body Diode Reverse Recovery Time	t_{rr}	-	136.7	-	ns	V_R=400V, I_F=17A, dI/dt=100A/us
Body Diode Reverse Recovery Charge	Q_{rr}	-	0.741	-	μC	
Peak reverse recovery current	I_{rrm}	-	10.28		A	

Electrical characteristics diagram

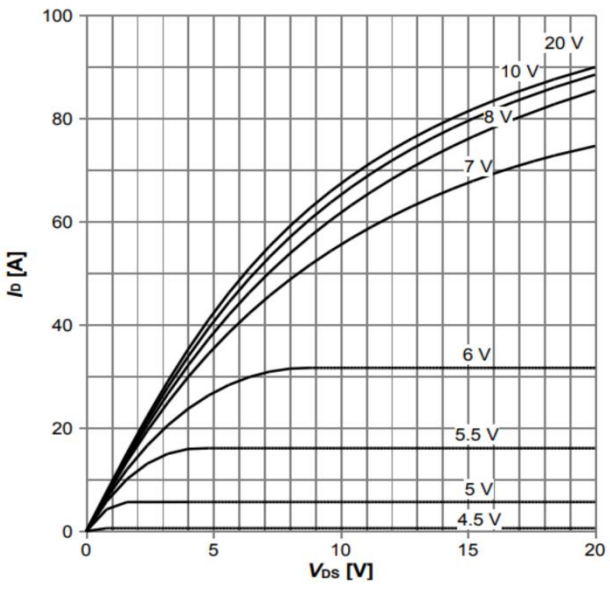
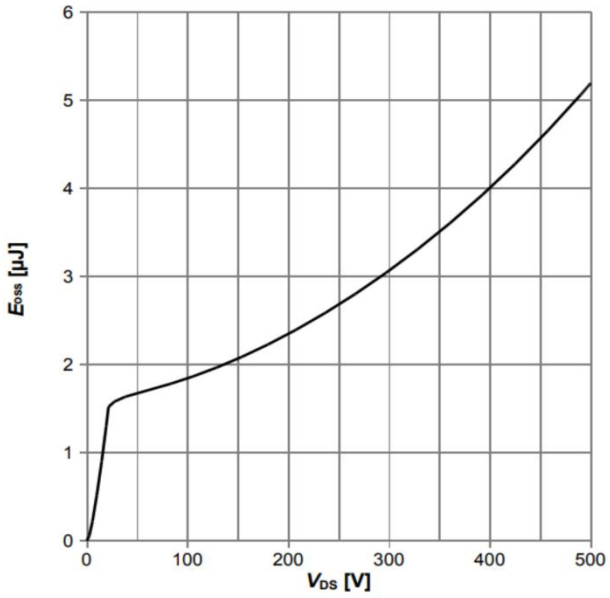
Diagram 1: Typ. output characteristics	Diagram 2: Typ. Coss stored energy
	
$I_D=f(V_{DS})$;T_j=25 °C; parameter: V_{GS}	*Eoss=f(VDS)*

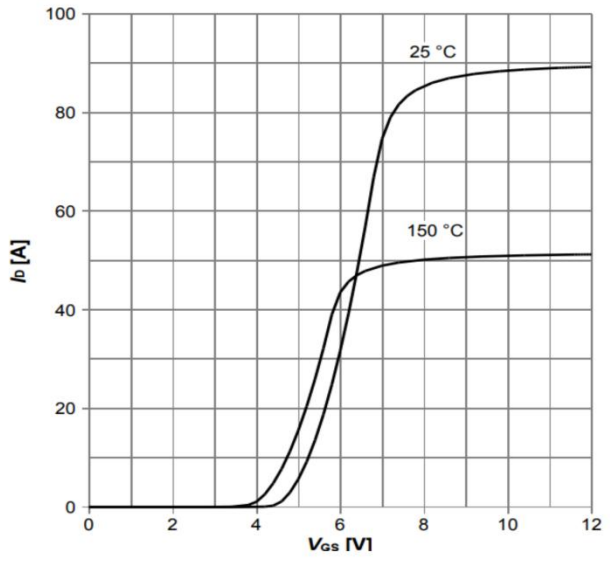
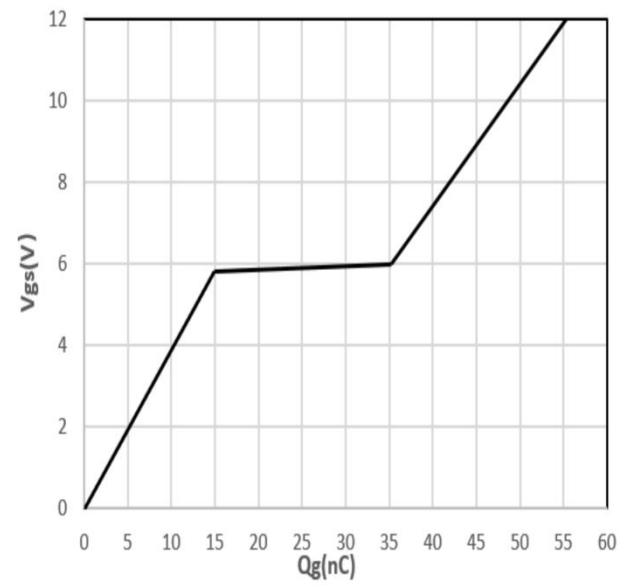
Diagram 3: Typ. transfer characteristics	Diagram 4: Typ. gate charge
	
$I_D=f(V_{GS})$;parameter: T_j	$V_{GS}=f(Q_{gate})$;I_D=19A pulsed; parameter: V_{DD}

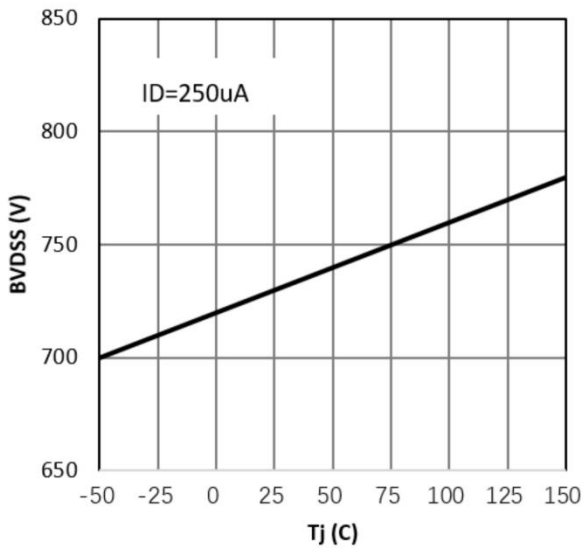
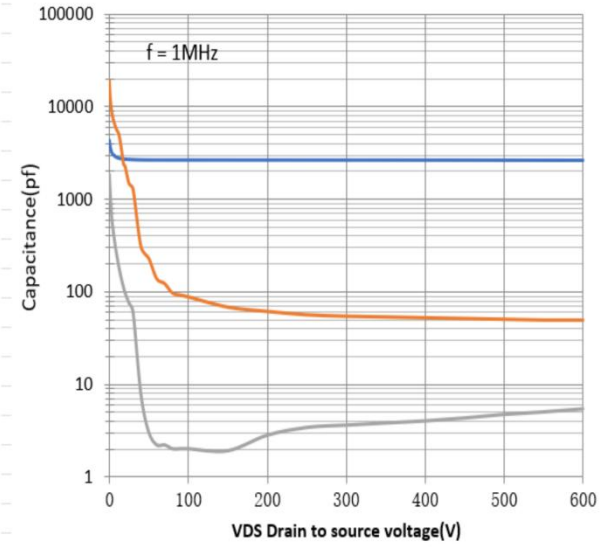
Diagram 5: Drain-source breakdown voltage	Diagram 6: Typ. capacitances
	
$V_{BR(DSS)}$=f(T_j);I_D=250uA	C=f(V_{DS});V_{GS}=0V; f=1MHz

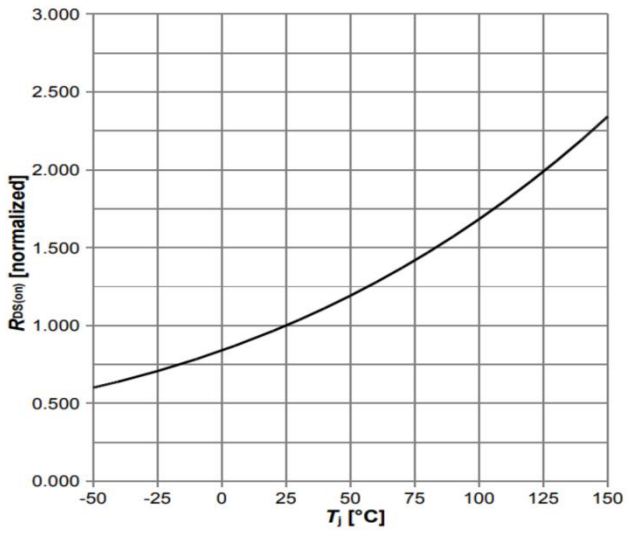
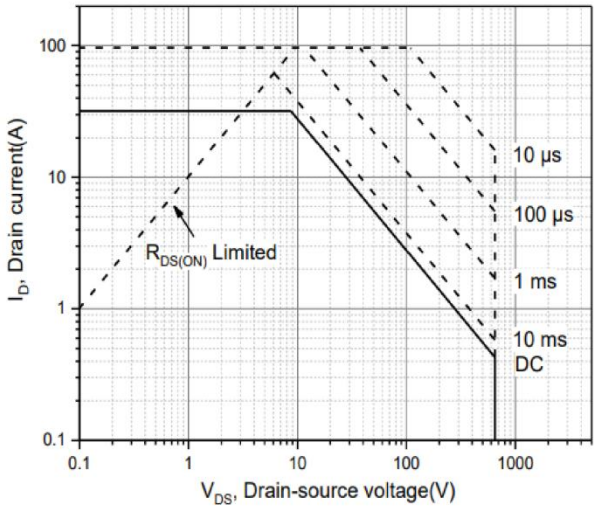
Diagram7:Typ. On-Resistance vs. Junction Temperature	Diagram 8: Safe operating area T_C=25 °C，
	
$R_{ds(on)}$=f(T_j);Vgs=10V/I_D=14A	I_D=f(V_{DS}); T_C=25 °C; V_{GS}> 7V; D=0; parameter tp

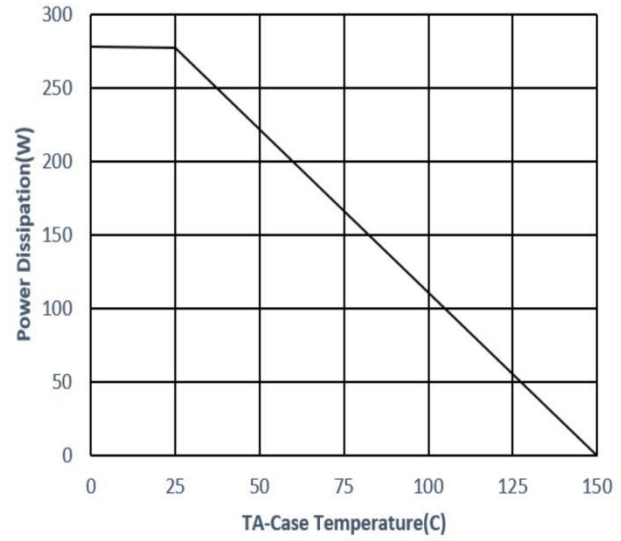
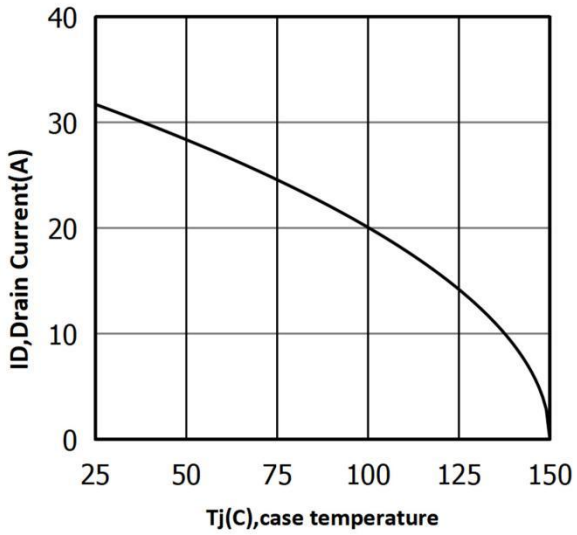
Diagram 9: Typ. Power Dissipation	Diagram 10: Drain Current
	
P_{tot}=f(T_C)	*ID=f(TC);VGS≥10V*

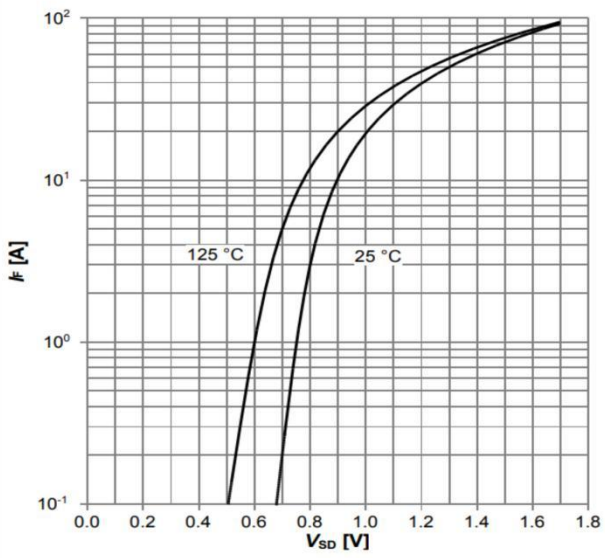
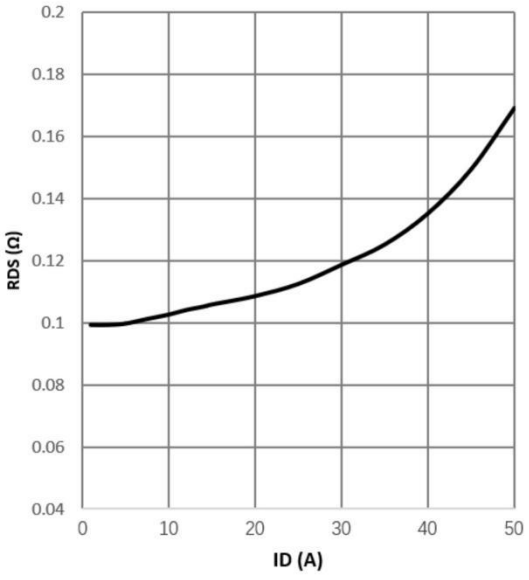
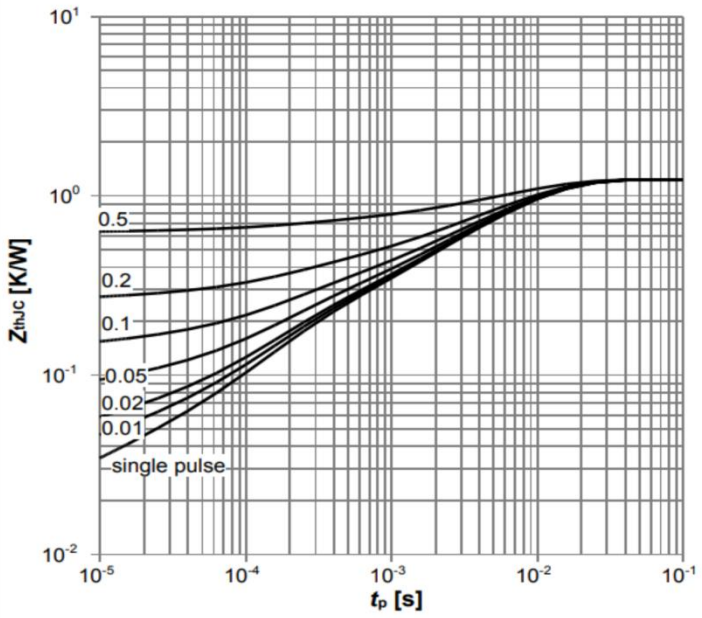
Diagram 11: Forward characteristics of reverse diode	Diagram 12: Typ. Drain-source on-state resistance
	
I_F=f(V_{DS});parameter: *Tj*	$R_{ds(on)}$=f(T_j);Tj=25C, Parameter :Vgs

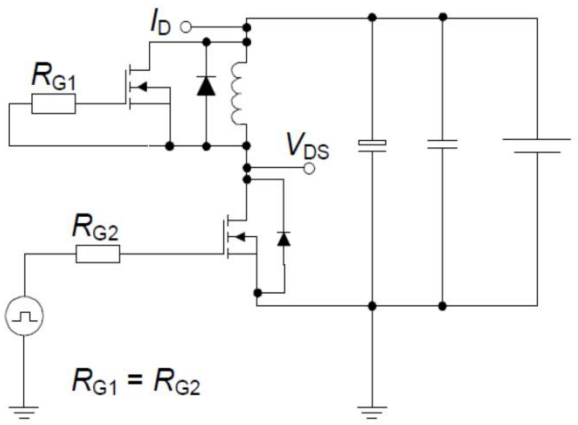
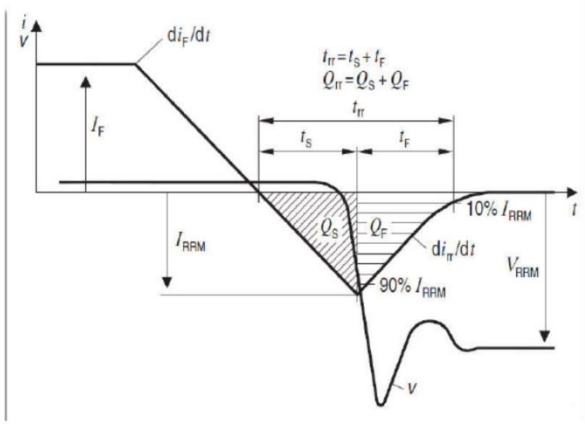
Diagram 13: Max. transient thermal impedance



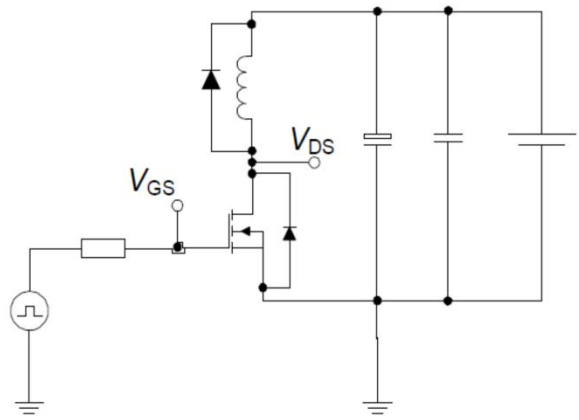
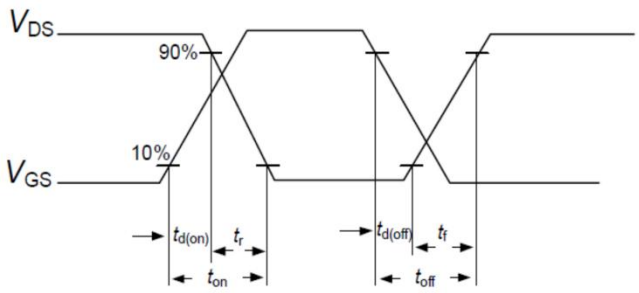
$Z_{thJC}=f(t_P)$; parameter: $D=t_p/T$

Test Circuits

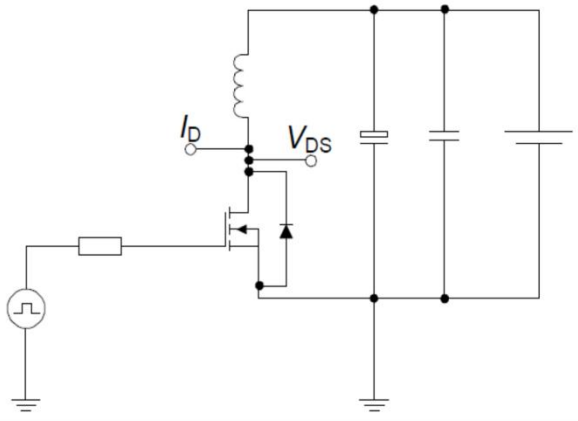
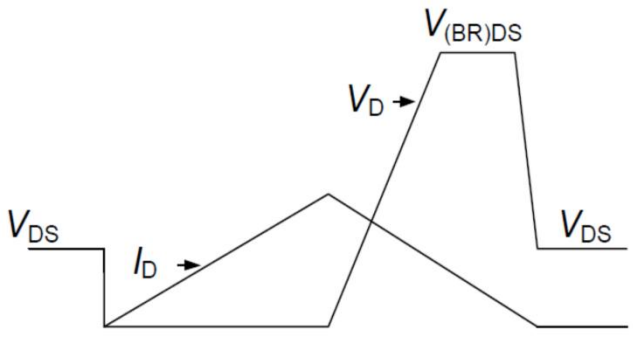
Diode characteristics

Test circuit for diode characteristics	Diode recovery waveform
	

Switching times

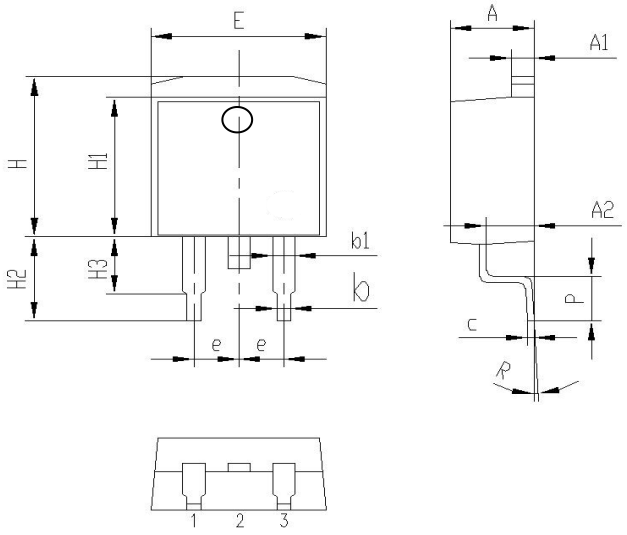
Switching times test circuit for inductive load	Switching times waveform
	

Unclamped inductive load

Unclamped inductive load test circuit	Unclamped inductive waveform
	

Package Information

TO-263 PACKAGE



基本尺寸

Symbol	单位 mm		
	Min	Nom	Max
A	4.40	4.6	4.80
A1	1.17	1.27	1.37
A2	2.40	2.6	2.80
b	0.60	0.8	1.00
b1	1.05	1.25	1.45
c	0.28	0.38	0.48
e	2.34	2.54	2.74
E	9.9	10.1	10.3
H	9.90	10.1	10.3
H1	8.50	8.7	8.90
H2	4.80	5.00	5.20
H3	2.60	2.8	3.00
R	0°	3°	6°
P	2.40	2.70	3.00

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