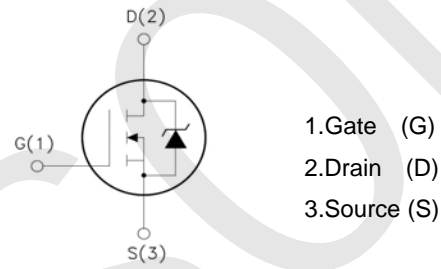
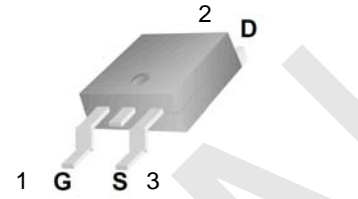




TO-263



SM65R380P

Features:

- Low Intrinsic Capacitances.
- Excellent Switching Characteristics.
- Extended Safe Operating Area.
- Unrivalled Gate Charge :Qg= 30nC (Typ.).
- BVDSS=650V, I_D=11A
- R_{DS(on)} : 0.38Ω (Max) @V_G=10V
- 100% Avalanche Tested

Absolute Maximum Ratings (Ta=25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
V _{DSS}	Drain-Source Voltage	650	V
I _D	Drain Current	T _C =25°C	11
		T _C =100°C	9
V _{GS(TH)}	Gate Threshold Voltage	±20	V
E _{AS}	Single Pulse Avalanche Energy (note1)	200	mJ
I _{AR}	Avalanche Current (note2)	11	A
P _D	Power Dissipation (Tc=25°C)	100	W
T _j	Junction Temperature(Max)	150	°C
T _{stg}	Storage Temperature	-55~+150	
TL	Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds	300	

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
R _{θJC}	Thermal Resistance, Junction to Case	-	1.25	°C/W
R _{θJA}	Thermal Resistance, Junction to Ambient	-	65	

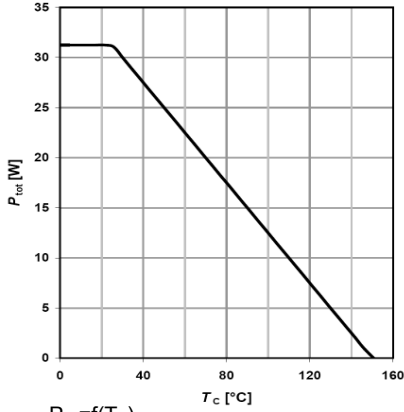
Electrical Characteristics (Ta=25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=250\mu A, V_{GS}=0$	650	-	-	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D=250\mu A$, Reference to 25°C	-	0.60	-	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=650V, V_{GS}=0V$	-	-	10	μA
		$V_{DS}=520V, T_c=125^\circ C$	-	-	100	
I_{GSSF}	Gate-body leakage Current, Forward	$V_{GS}=+30V, V_{DS}=0V$	-	-	100	nA
I_{GSSR}	Gate-body leakage Current, Reverse	$V_{GS}=-30V, V_{DS}=0V$	-	-	-100	
On Characteristics						
$V_{GS(TH)}$	Gate Threshold Voltage	$I_D=250\mu A, V_{DS}=V_{GS}$	3	-	5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$I_D=5.5A, V_{GS}=10V$	-	0.36	0.38	Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=25V, V_{GS}=0,$ $f=1.0MHz$	-	2000	-	μF
C_{oss}	Output Capacitance		-	84	-	
C_{rss}	Reverse Transfer Capacitance		-	2.8	-	
Switching Characteristics						
$T_d(on)$	Turn-On Delay Time	$V_{DD}=325V, I_D=5.5A$ $R_G=20\Omega$ (Note 3,4)	-	50	-	ns
T_r	Turn-On Rise Time		-	50	-	
$T_d(off)$	Turn-Off Delay Time		-	70	-	
T_f	Turn-Off Rise Time		-	32	-	
Q_g	Total Gate Charge	$V_{DS}=520, V_{GS}=10V,$ $I_D=5.5A$ (Note 3,4)	-	38	-	nC
Q_{gs}	Gate-Source Charge		-	4	-	
Q_{gd}	Gate-Drain Charge		-	4.2	-	
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Max. Diode Forward Current	-	-	-	11	A
I_{SM}	Max. Pulsed Forward Current	-	-	-	44	
V_{SD}	Diode Forward Voltage	$I_D=5.5A$	-	-	1.5	V
T_{rr}	Reverse Recovery Time	$I_S=5A, V_{GS}=0V$ $diF/dt=100A/\mu s$	-	485	-	ns
Q_{rr}	Reverse Recovery Charge	(Note3)	-	7.2	-	μC

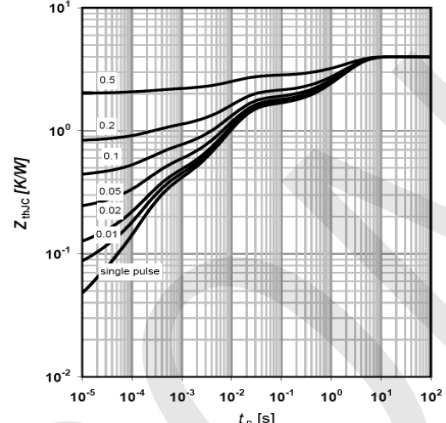
NOTES:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $I_{AS}=1.8A, V_{DD}=50V$, Starting $T_J=25^\circ C$
3. $I_{SD}=I_D, di/dt \leq 200A/\mu s, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ C$
4. Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 2\%$
5. Essentially Independent of Operating Temperature Typical Characteristics

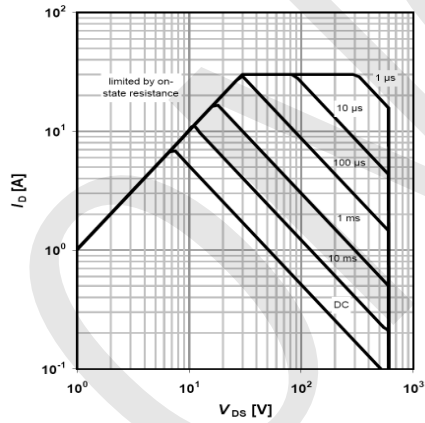
Typical Characteristics



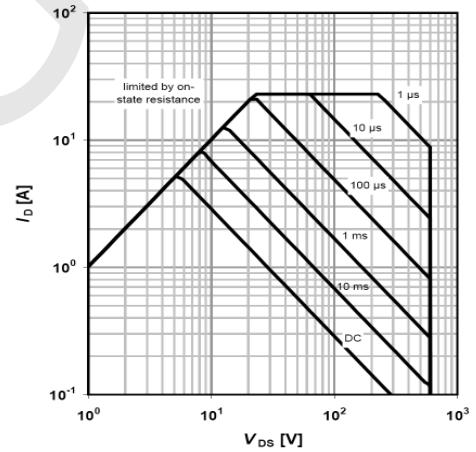
$P_{tot}=f(T_c)$
Power dissipation TO-220FullPAK
Transient thermal impedance



$Z_{th(jc)}=f(t_p)$; Parameter: $D=t_p/T$
Max. Transient thermal impedance TO-220FullPAK

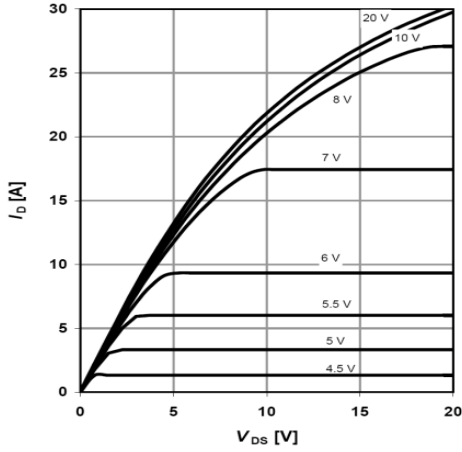


$I_D=f(V_{DS})$; $T_c=25^{\circ}C$; $D=0$ parameter t_p
Safe Operating area $T_c=25^{\circ}C$ TO-220FullPAK

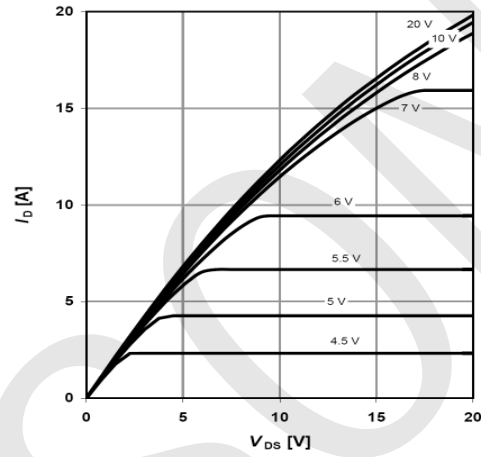


$I_D=f(V_{DS})$; $T_c=80^{\circ}C$; $D=0$ parameter t_p
Safe Operating area $T_c=80^{\circ}C$ TO-220FullPAK

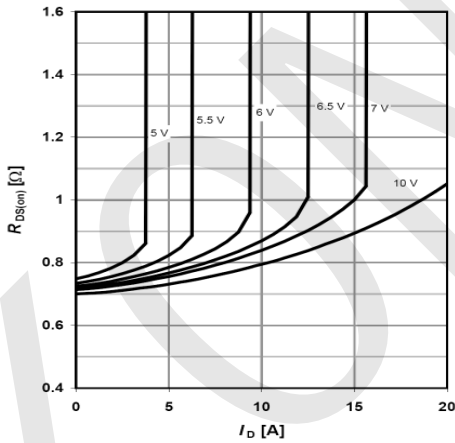
Typical Characteristics



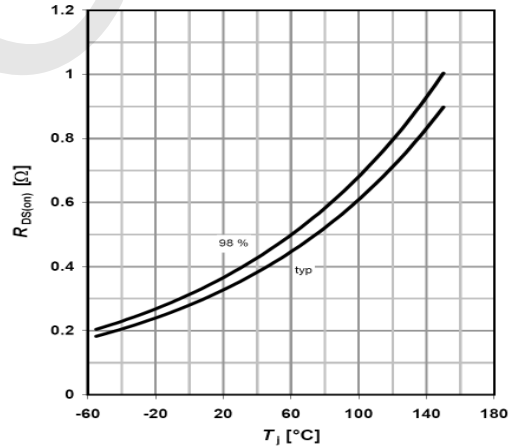
$I_D = f(V_{DS}); T_j = 25^\circ\text{C};$ parameter: V_{GS}
Typ. Output characteristics $T_j = 25^\circ\text{C}$



$I_D = f(V_{DS}); T_j = 125^\circ\text{C};$ parameter: V_{GS}
Typ. Output characteristics $T_j = 125^\circ\text{C}$

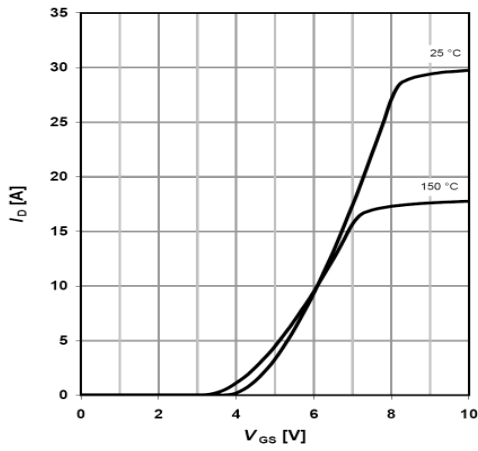


$R_{DS(on)} = f(I_D); T_j = 125^\circ\text{C};$ parameter: V_{GS}
Typ. Drain-source on-state resistance

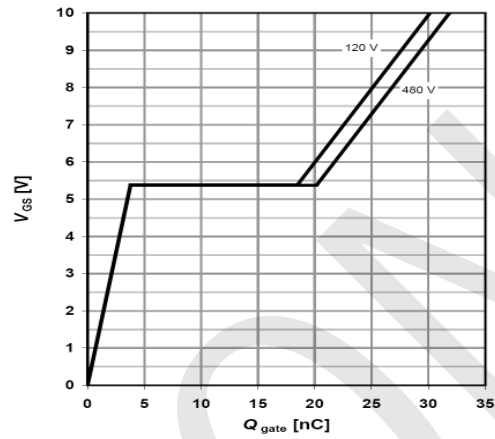


$R_{DS(on)} = f(T_j); I_D = 3.8\text{A}; V_{GS} = 10\text{V}$
Drain-source on-state resistance

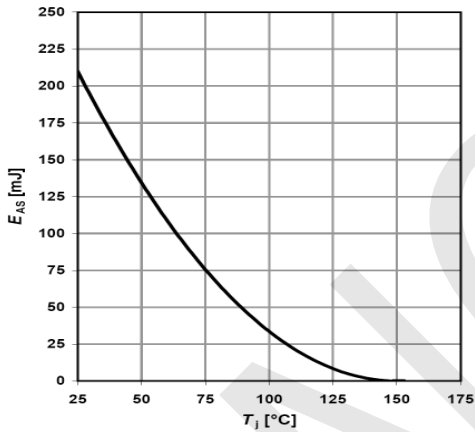
Typical Characteristics



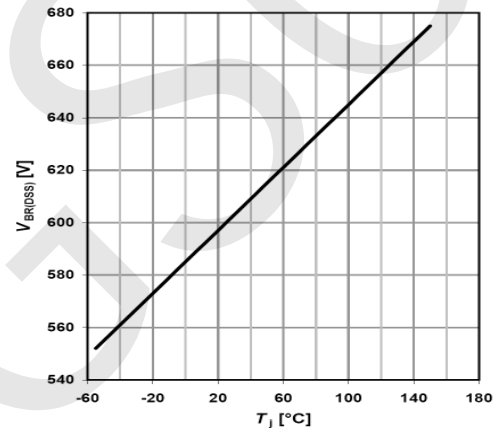
$I_D = f(V_{GS}); V_{DS} = 20V$
Typ. Transfer characteristics



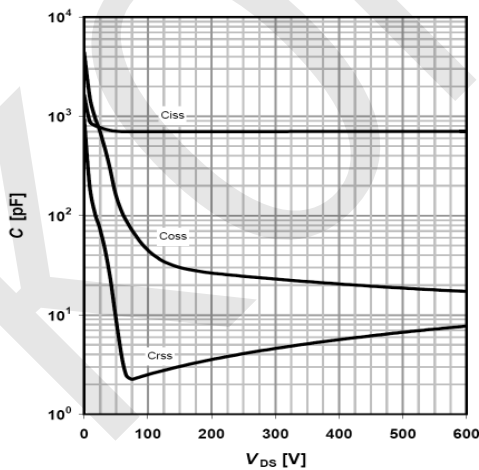
$V_{GS} = f(Q_{gate}); I_D = 4.8A$ pulsed
Typ. Gate charge



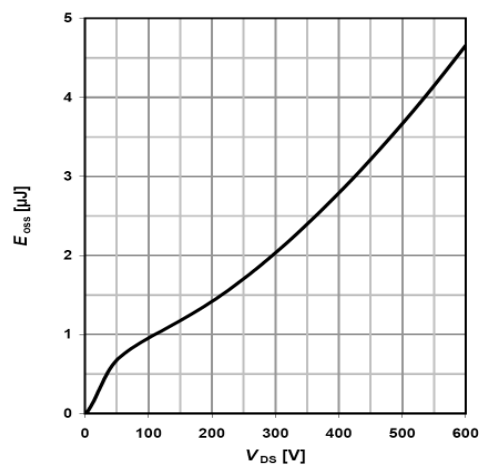
$E_{AS} = f(T_J); I_D = 1.8A; V_{DD} = 50V$
Avalanche energy



$V_{BR(DSS)} = f(T_J); I_D = 250\mu A$
Drain-source break down voltage



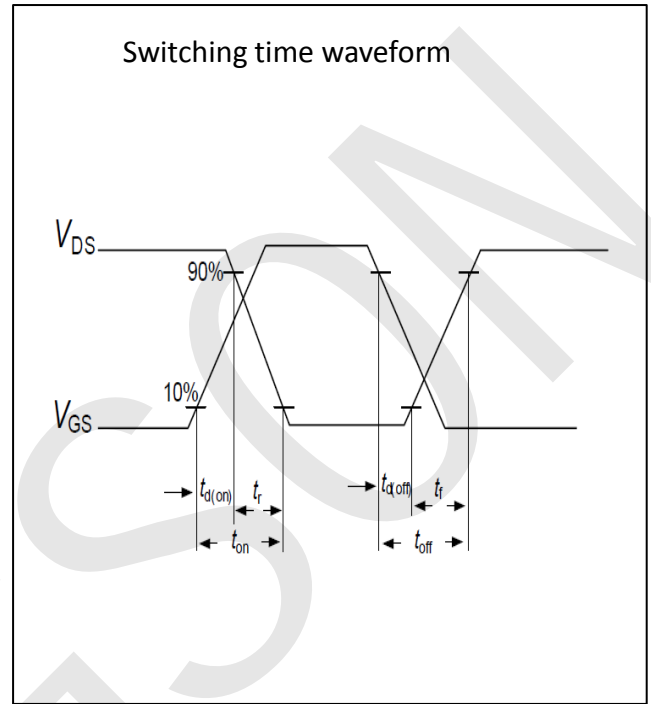
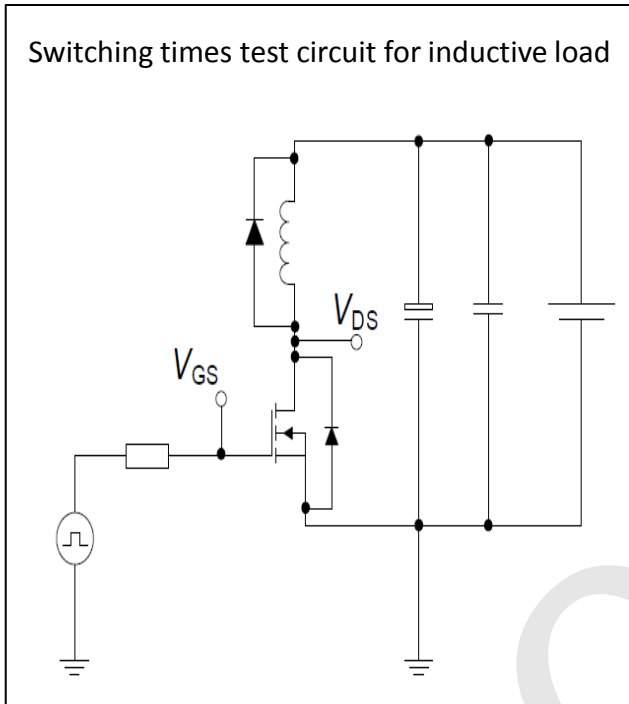
$C = f(V_{DS}); V_{GS} = 0V; f = 1MHz$
Typ. Capacitances



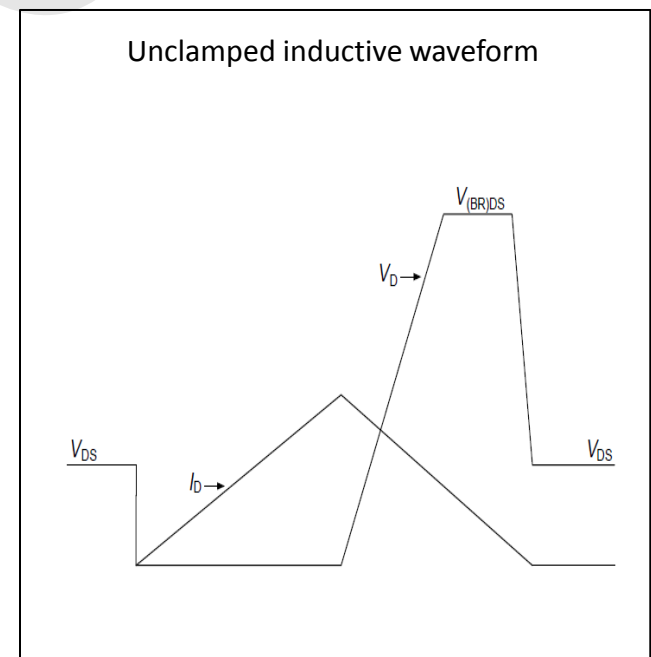
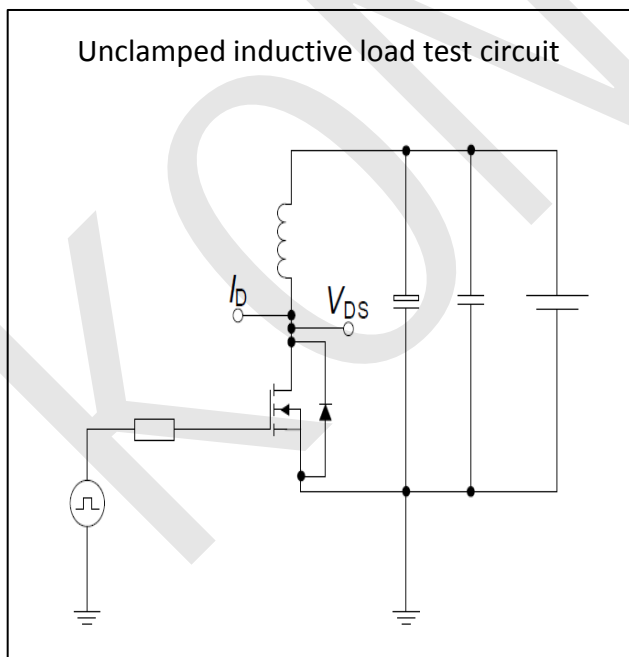
$E_{oss} = f(V_{DS})$
Typ. C_{oss} Store energy

Typical Characteristics

Switching times test circuit and waveform for inductive load

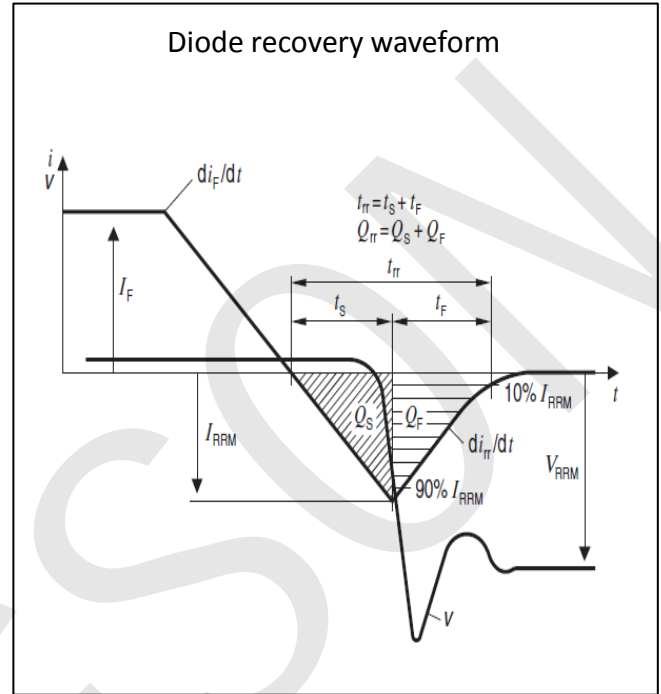
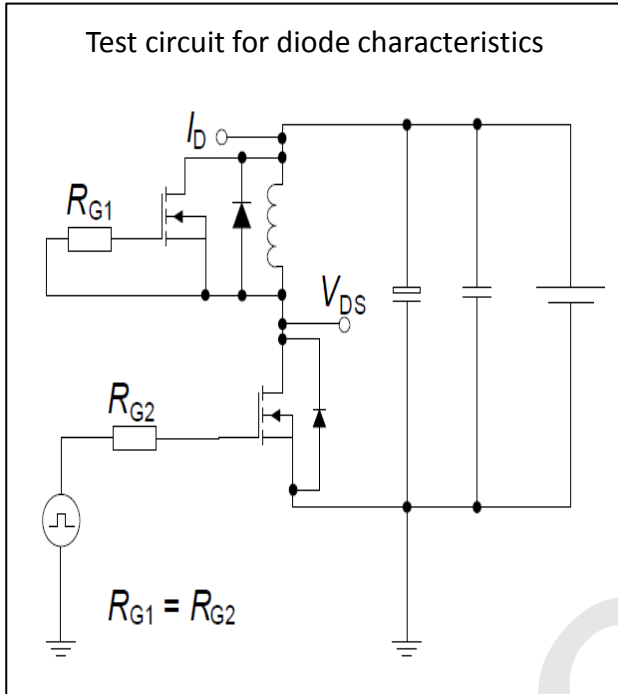


Unclamped inductive load test circuit and waveform



Typical Characteristics

Test circuit and waveform for diode characteristics



Package Dimension

TO-263

Unit:mm

