



### Silicon Carbide Enhancement Mode MOSFET

#### Features

Preliminary

- ◆  $V_{DSS} = 1200V$
- ◆  $R_{DS(ON)} < 20m\Omega @ V_{GS} = 20 V$
- ◆ Fully Avalanche Rated
- ◆ Pb Free & RoHS Compliant
- ◆ Isolation Type Package
- ◆ Electrically Isolation base plate

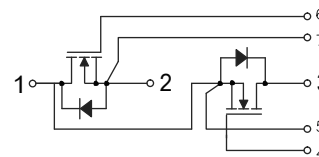
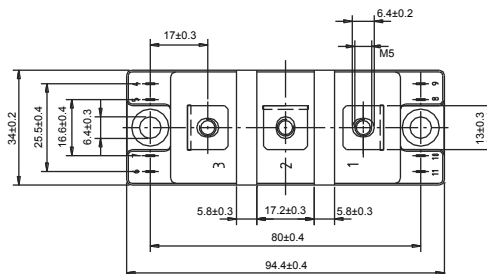
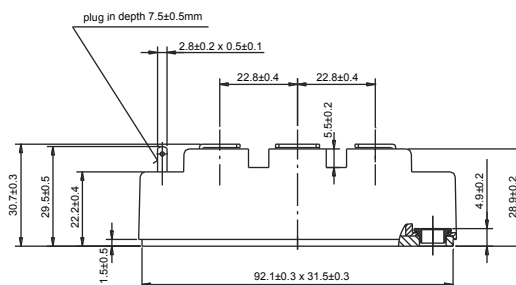


#### Applications

- ◆ Solar Inverters
- ◆ Switch Mode Power Supplies
- ◆ Power Converters
- ◆ Battery Chargers
- ◆ Motor Drive

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

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	$V_{DS}$	1200	V
Gate-Source Voltage	$V_{GS}$	-5/+20	V
Drain Current-Continuous @ Tc = 25°C @ Tc = 100°C	$I_D$	160 110	A
Drain Current-Pulsed @ Tc = 25°C <small>Note1</small>	$I_{DM}$	400	A
Maximum Power Dissipation	$P_D$	580	W
Storage Temperature Range	$T_{STG}$	-50 to +150	°C
Operating Junction Temperature Range	$T_J$	-50 to +150	°C
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.22	°C/W
Isolation Voltage (A.C. 1 minute)	$V_{iso}$	3000	V
Mounting torque (M5 Screw)	$M_d$	3-5	Nm
Weight		170	g





**Electrical Characteristics @ T<sub>J</sub> =25°C (unless otherwise specified)**

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>OFF Characteristics</b>						
Drain-Source Breakdown Voltage	<b>BV<sub>DSS</sub></b>	V <sub>GS</sub> =0V , I <sub>DS</sub> =100uA	1200	-	-	V
Zero Gate Voltage Drain Current	<b>I<sub>DSS</sub></b>	V <sub>GS</sub> =0V , V <sub>DS</sub> =1200V	-	-	200	uA
Gate-Body Leakage	<b>I<sub>GSS</sub></b>	V <sub>GS</sub> =±20V , V <sub>DS</sub> =0V	-	-	200	nA
<b>ON Characteristics</b>						
Gate Threshold Voltage	<b>V<sub>TH</sub></b>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =8mA	2.0	2.5	3.5	V
Drain-Source On-State Resistance	<b>R<sub>DS(on)</sub></b>	V <sub>GS</sub> =20V , I <sub>DS</sub> =100A	-	16	20	mΩ
Gate Resistance	<b>R<sub>G</sub></b>		-	1.6	2.9	Ω
Forward Transconductance	<b>g<sub>fs</sub></b>	V <sub>DS</sub> =20V , I <sub>D</sub> =100A <sup>Note1</sup>	-	30	-	S
<b>Dynamic Characteristics</b>						
Input Capacitance	<b>C<sub>iss</sub></b>	V <sub>DS</sub> =800V V <sub>GS</sub> =0V	-	6000	-	pF
Output Capacitance	<b>C<sub>oss</sub></b>	V <sub>AC</sub> =25mV	-	368	-	
Reverse Transfer Capacitance	<b>C<sub>rss</sub></b>	Freq.=1MHz	-	80	-	
Turn-On Switching Energy	<b>E<sub>on</sub></b>	V <sub>DD</sub> =800V , V <sub>GS</sub> =-5V/+20V I <sub>D</sub> =100A , R <sub>G(ext)</sub> =5.1Ω	-	3.9	-	mJ
Turn-Off Switching Energy	<b>E<sub>off</sub></b>	Load=200μH , T <sub>J</sub> =125°C	-	1.8	-	
<b>Switching Characteristics</b>						
Turn-On Delay Time	<b>t<sub>d(on)</sub></b>	V <sub>DD</sub> =600V	-	41	-	ns
Rise Time	<b>t<sub>r</sub></b>	V <sub>GS</sub> =20V	-	30	-	
Turn-Off Delay Time	<b>t<sub>d(off)</sub></b>	I <sub>DS</sub> =150A	-	72	-	
Fall Time	<b>t<sub>f</sub></b>	R <sub>G</sub> =2.5Ω	-	30	-	
Total Gate Charge at 10V	<b>Q<sub>g</sub></b>	V <sub>DS</sub> =800V	-	360	-	nC
Gate to Source Charge	<b>Q<sub>gs</sub></b>	V <sub>GS</sub> =20V	-	90	-	
Gate to Drain Charge	<b>Q<sub>gd</sub></b>	I <sub>DS</sub> =100A	-	98	-	
<b>Reverse Diode Characteristics</b>						
Drain-Source Diode Forward Voltage	<b>V<sub>F</sub></b>	T <sub>J</sub> =25°C , I <sub>F</sub> =160A	-	-	6.5	V
Diode Continuous Forward Current	<b>I<sub>F</sub></b>		-	-	110	A
Diode Pulsed Current <sup>Note1</sup>	<b>I<sub>F,pulse</sub></b>		-	-	400	A
Reverse Recovery time	<b>T<sub>RR</sub></b>	I <sub>F</sub> =0.5V , I <sub>R</sub> =1.0A , I <sub>RR</sub> =0.25A	-	-	185	ns

Notes:

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle > 2%.



Typical Characteristics

Figure 1. Maximum Power Dissipation (MOSFET) Derating vs. Case Temperature

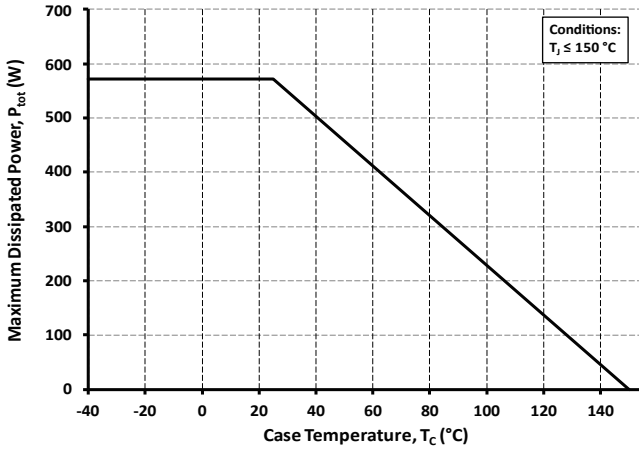


Figure 2. Continuous Drain Current (MOSFET) Derating vs Case Temperature

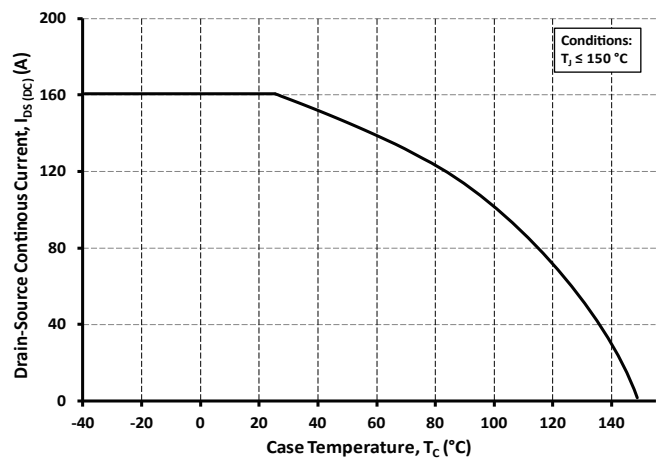


Figure 3. Maximum Power Dissipation (MOSFET) Derating vs. Case Temperature

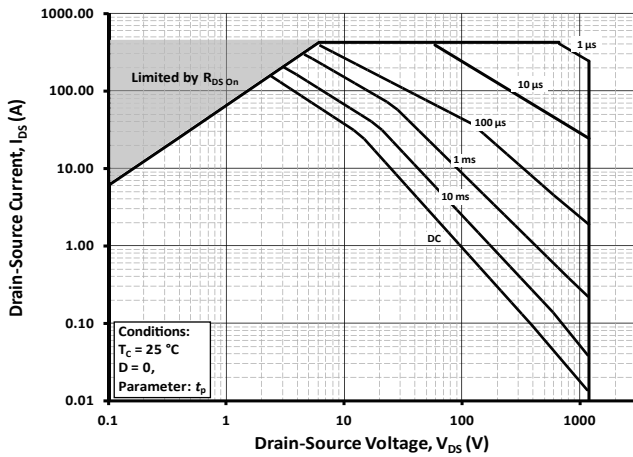


Figure 4. MOSFET Junction to Case Thermal Impedance

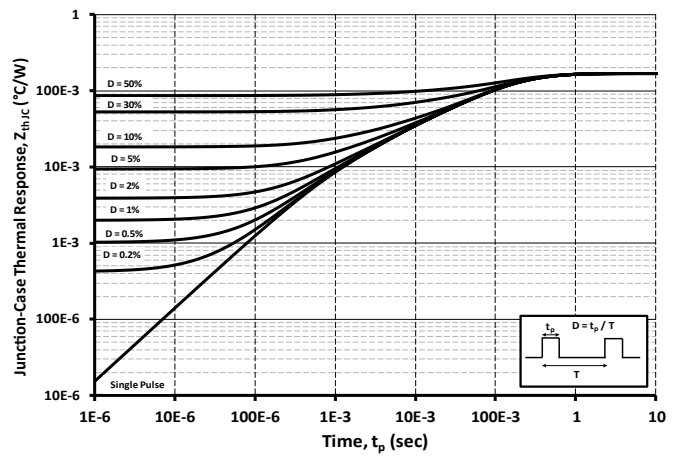


Figure 5. Output Characteristics Tj = 25 °C

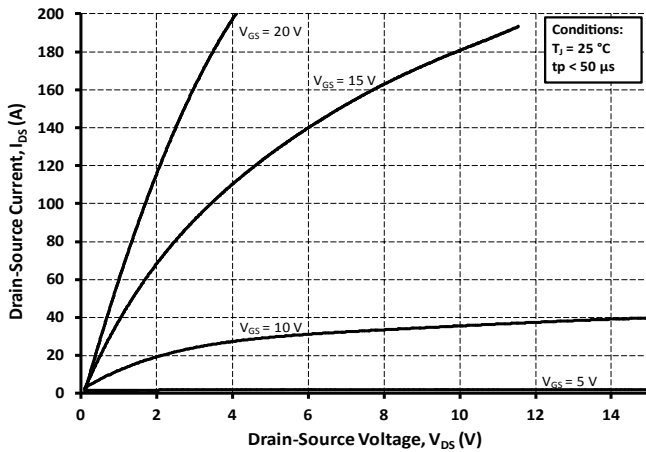
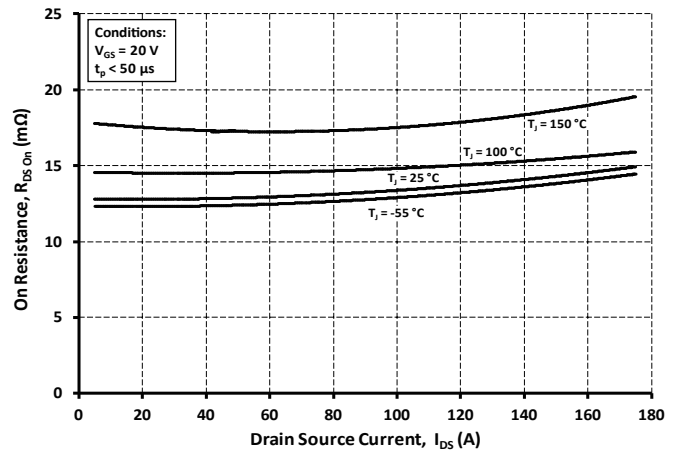


Figure 6. On-Resistance vs. Drain Current For Various Temperatures





Typical Characteristics

Figure 7. On-Resistance vs. Temperature For Various Gate-Source Voltage

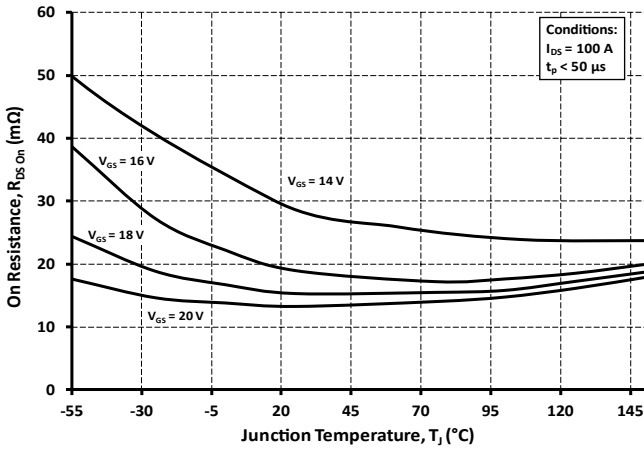


Figure 8. Threshold Voltage vs. Temperature

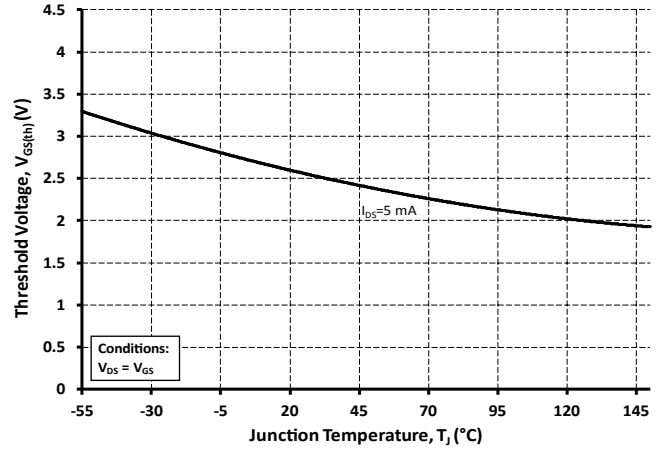


Figure 9. Transfer Characteristic for Various Junction Temperatures

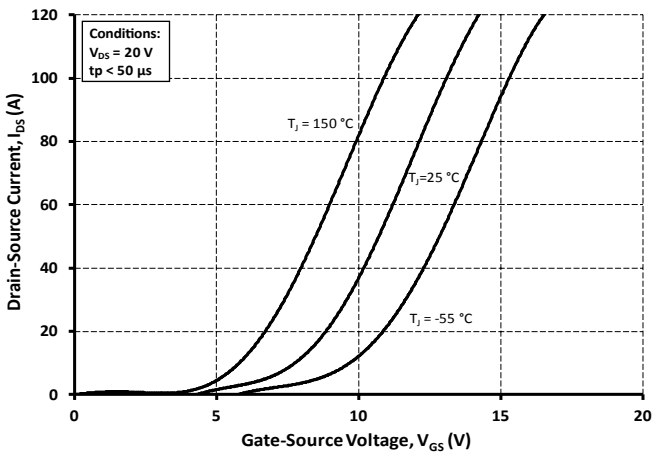


Figure 10. Capacitances vs. Drain-Source Voltage (0 - 1 kV)

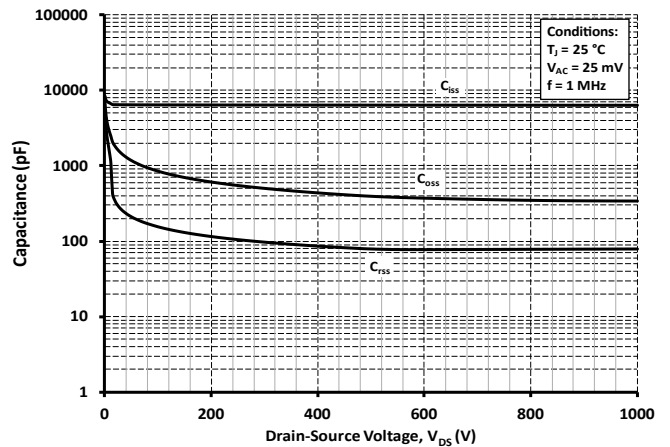


Figure 11. Typical forward characteristics of reverse diode

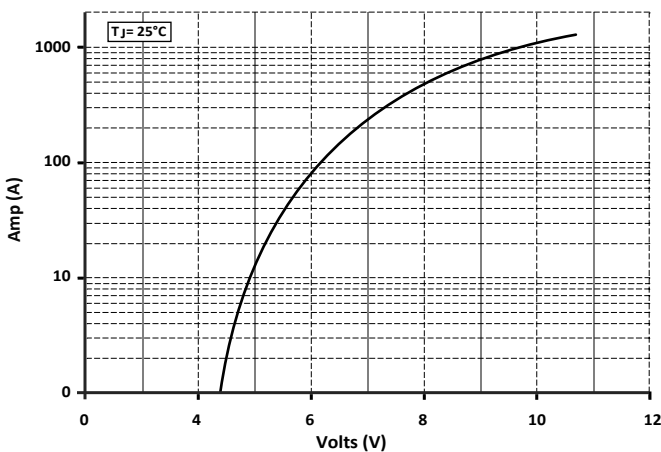
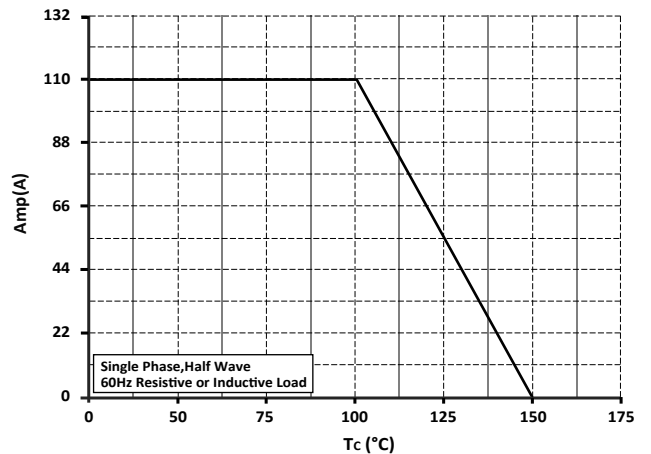


Figure 12. Forward derating curve of reverse diode





Typical Characteristics

Figure 13. Peak forward surge current of reverse diode

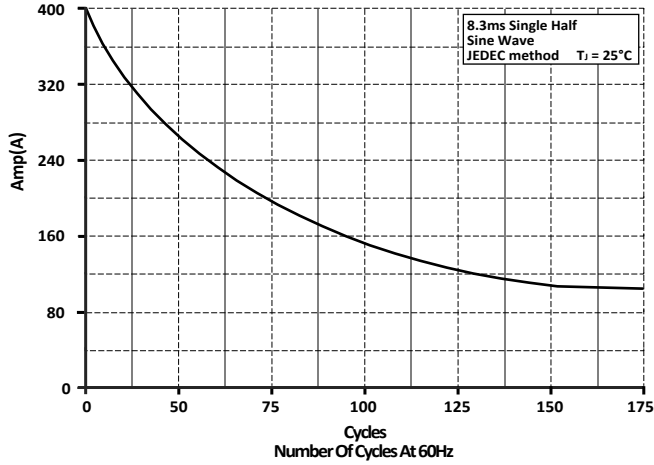


Figure 14. Typical reverse diode characteristics

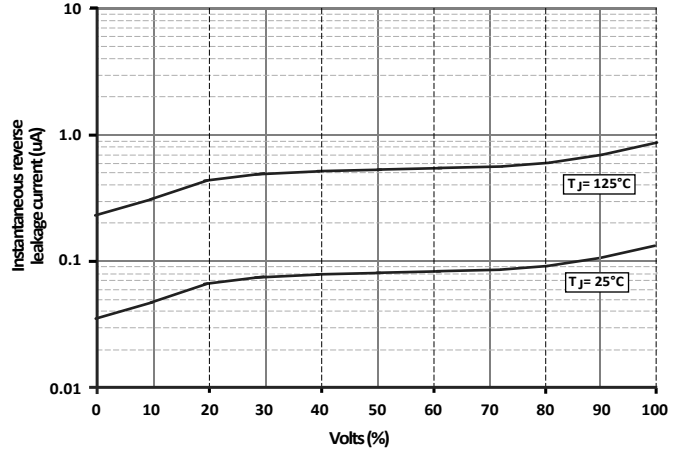


Figure 15. Gate Charge Characteristics

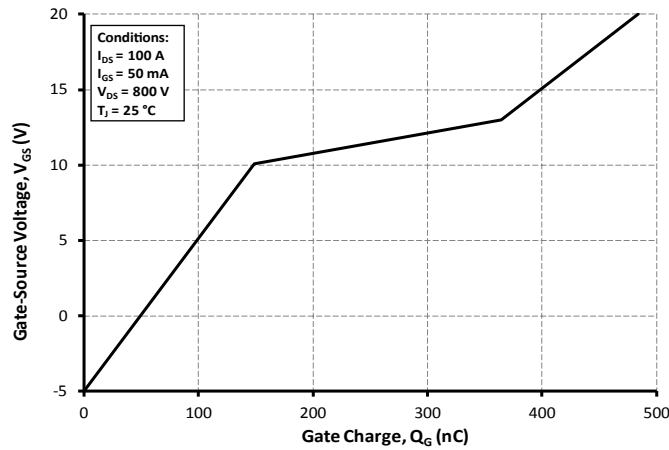


Figure 16. Inductive Switching Energy vs. Temperature

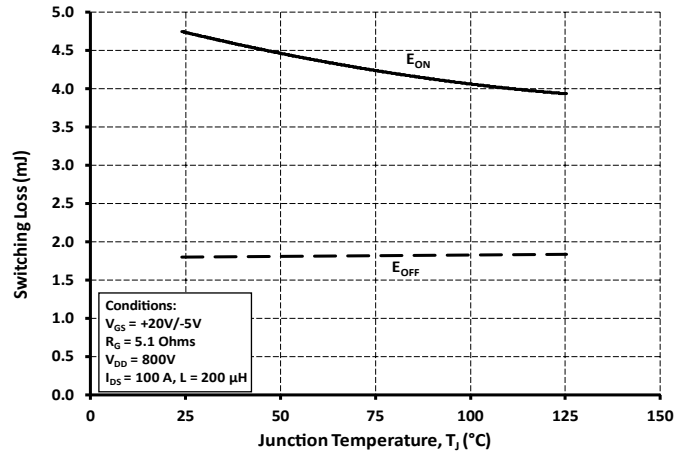


Figure 17. Timing vs. Rg(ext)

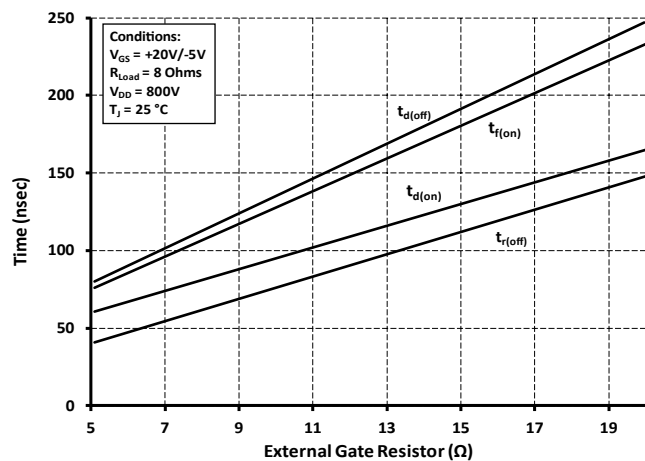
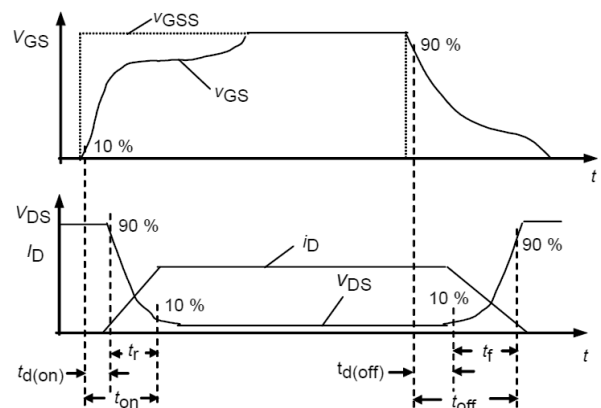


Figure 18. Resistive Switching Time Description





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