

**Description**

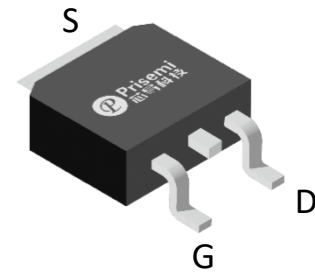
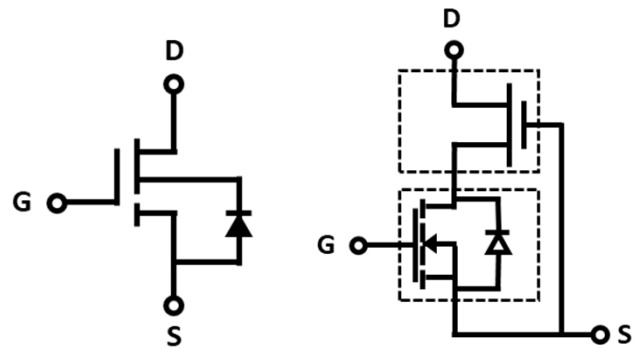
Product Summary		
$V_{DS}(V)$	$R_{DS(on)}(m\Omega)(Typ)$	$I_D(A)$
700	125	12

**Feature**

- Easy to use, compatible with standard gate drivers
- Excellent  $Q_G \times R_{DS(on)}$  figure of merit (FOM)
- Low  $Q_{RR}$ , no free-wheeling diode required
- Low switching loss
- RoHS compliant and Halogen-free

**Applications**

- High efficiency power supplies
- Telecom and datacom
- Automotive
- Servo motors


**TO-252 (Top View)**

**Schematic Symbol**
**Cascode Device Structure**
**Absolute maximum rating@25°C**

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	700	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Transient Drain-Source Voltage <sup>1)</sup>	$V_{TDS}$	800	V
Continuous Drain Current	$I_D$	$T_C=25^\circ C$	12
		$T_C=100^\circ C$	7.7
Pulsed Drain Current (Pulse Width: 100 $\mu s$ )	$I_{DM}$	$T_C=25^\circ C$	49
		$T_C=150^\circ C$	37
Power Dissipation	$P_D$	36	W
Soldering Peak Temperature	$T_{CSOLD}$	260	$^\circ C$
Operating Junction and Storage Temperature	$T_J, T_{STG}$	-55 to 150	$^\circ C$

**Thermal Resistance**

Parameter	Symbol	Min	Typ	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	-	3.5	-	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient <sup>2)</sup>	$R_{\theta JA}$	-	50	-	$^\circ C/W$

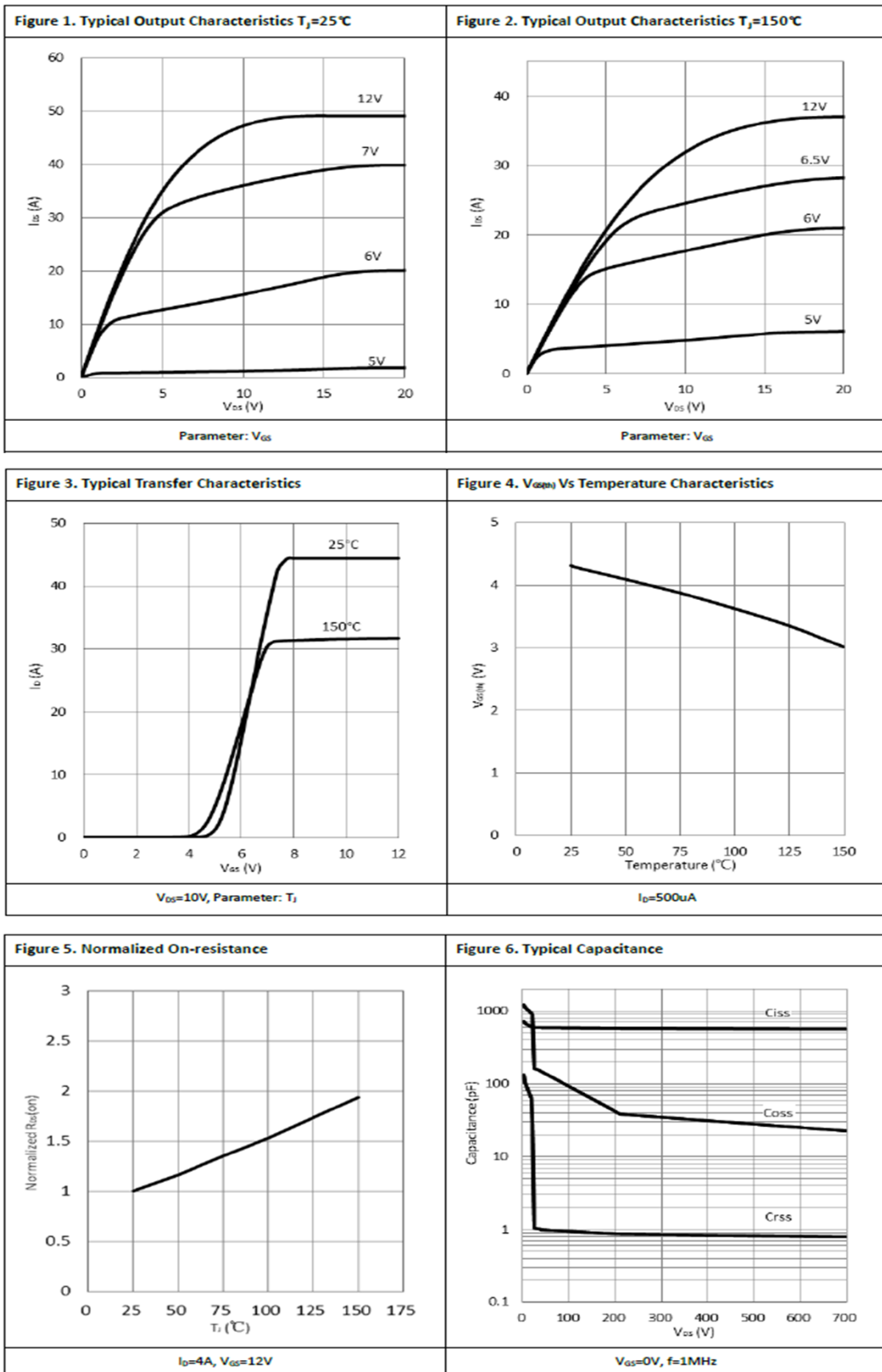
## Electrical characteristics per line@25°C (unless otherwise specified)

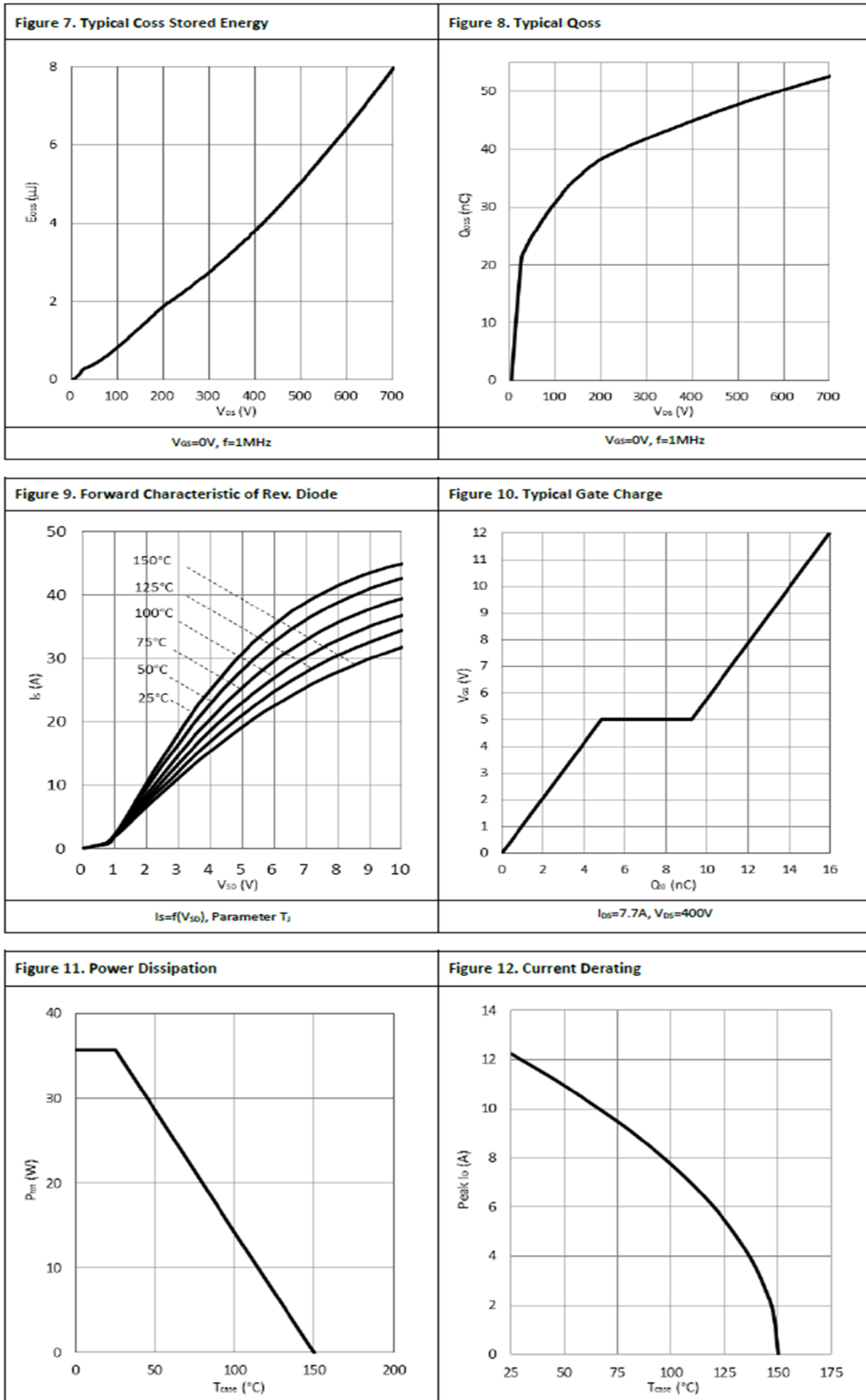
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units	
<b>Statistic Characteristics</b>							
Maximum Drain-Source Voltage	$V_{DS-Max}$	$V_{GS} = 0V$	700	-	-	V	
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	-	1000	-	V	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=700V,$ $V_{GS}=0V$	$T_J=25^\circ C$	-	8	20	$\mu A$
			$T_J=150^\circ C$	-	50	-	
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	$\pm 150$	nA	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 500\mu A$	3	4	5	V	
Gate threshold voltage temperature coefficient	$\Delta V_{GS(th)}/T_J$		-	-10.7	-	mV/°C	
Drain-Source On-State Resistance <sup>3)</sup>	$R_{DS(ON)}$	$V_{GS}=12V,$ $I_D=4A$	$T_J=25^\circ C$	-	125	160	mΩ
			$T_J=150^\circ C$	-	250	-	
<b>Dynamic Characteristics</b>							
Input Capacitance	$C_{iss}$	$V_{DS} = 400V, V_{GS} = 0V,$ $f = 1MHz$	-	555	-	pF	
Output Capacitance	$C_{oss}$		-	29	-		
Reverse Transfer Capacitance	$C_{rss}$		-	0.8	-		
Effective Output Capacitance, Energy Related	$C_{o(er)}$	$V_{GS} = 0V,$ $V_{DS} = 0-400V$	-	48	-	pF	
Effective Output Capacitance, Time Related	$C_{o(tr)}$		-	113	-		
Output Charge	$Q_{oss}$		-	45	-		nC
Turn-on Delay Time	$t_{d(on)}$	$V_{DS} = 400V, I_D = 7A,$ $V_{GS} = 0-12V, R_G = 47\Omega$	-	50	-	ns	
Turn-on Rise Time	$t_r$		-	6	-		
Turn-Off Delay Time	$t_{d(off)}$		-	80	-		
Turn-Off Fall Time	$t_f$		-	5	-		
Total Gate Charge	$Q_g$	$V_{DS} = 400V, I_D = 7.7A,$ $V_{GS} = 0-12V$	-	16	-	nC	
Gate-Source Charge	$Q_{gs}$		-	4.8	-		
Gate-Drain Charge	$Q_{gd}$		-	4.4	-		
<b>Reverse Diode Characteristics</b>							
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=3.8A$	-	1.1	-	V	
		$V_{GS}=0V,$ $I_S=7A$	$T_J=25^\circ C$	-	1.5		-
			$T_J=150^\circ C$	-	2		-
Reverse Recovery Time	$t_{rr}$	$V_{GS}=0V, I_S=7A,$ $V_{DD}=400V,$ $di/dt=1000A/\mu s$	-	21	-	ns	
Reverse Recovery Charge	$Q_{rr}$		-	45	-	$\mu C$	

## Notes:

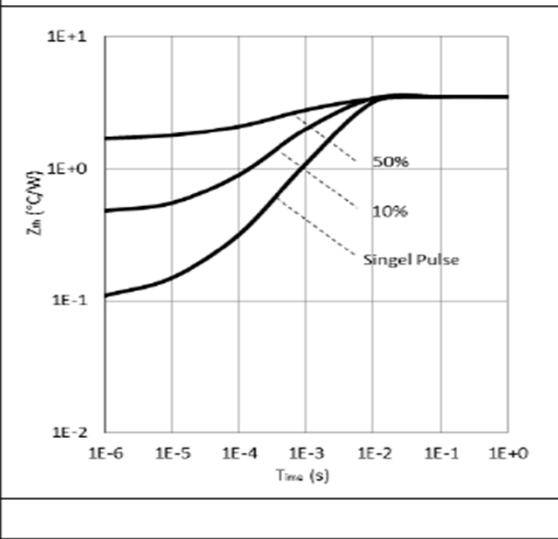
- Off-state spike duty cycle < 0.01, spike duration < 2 $\mu s$
- Device on one layer epoxy PCB for drain connection (vertical and without air stream cooling, with 6cm<sup>2</sup>copper area and 70 $\mu m$  thickness)
- Dynamic on-resistance; see Figure 19 and 20 for test circuit and configurations

## Typical Characteristics

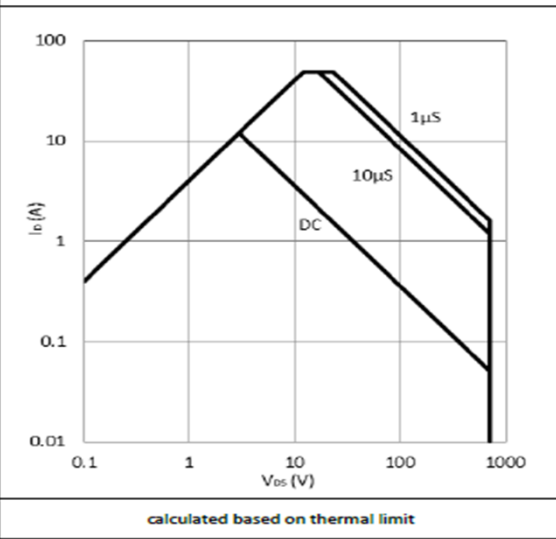




**Figure 13. Transient Thermal Resistance**

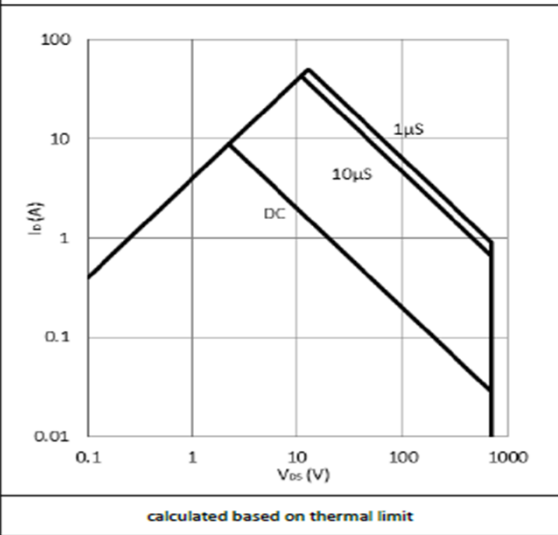


**Figure 14. Safe Operating Area  $T_c=25^{\circ}\text{C}$**



calculated based on thermal limit

**Figure 15. Safe Operating Area  $T_c=80^{\circ}\text{C}$**



calculated based on thermal limit

Test Circuits and Waveforms

Figure 16. Switching Time Test Circuit

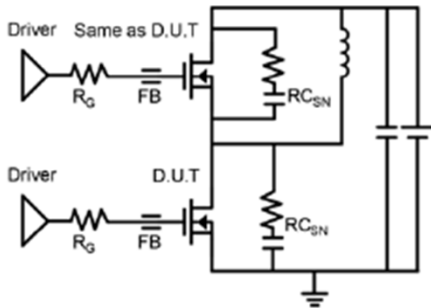


Figure 17. Switching Time Waveform

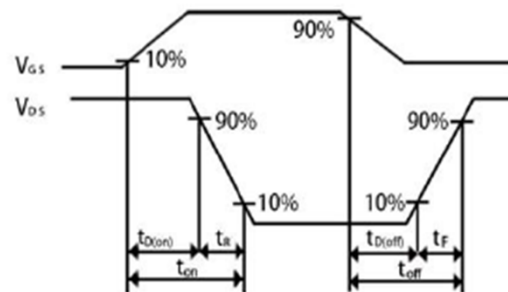


Figure 18. Dynamic R\_DS(on) Test Circuit

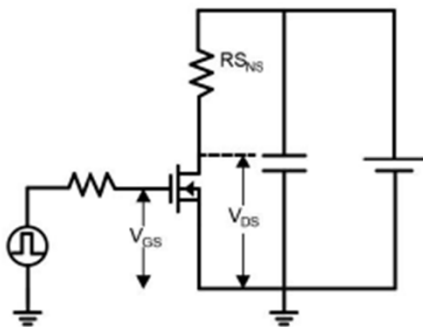


Figure 19. Dynamic R\_DS(on) Waveform

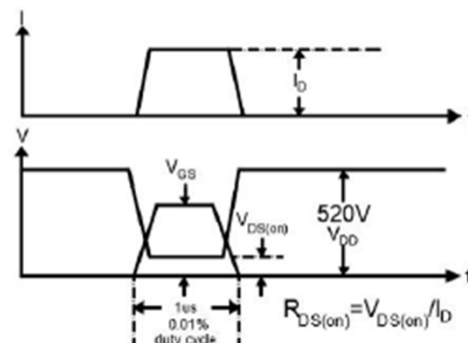


Figure 20. Diode Characteristic Test Circuits

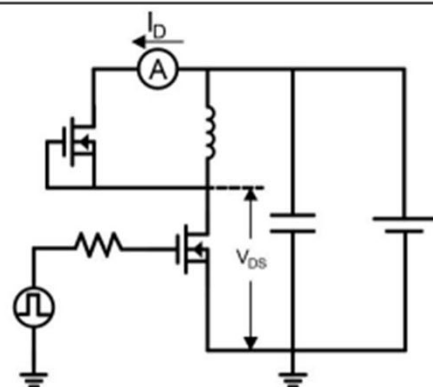
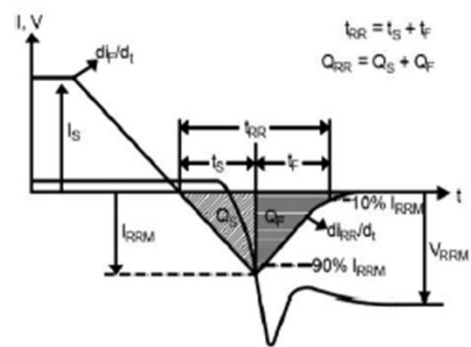
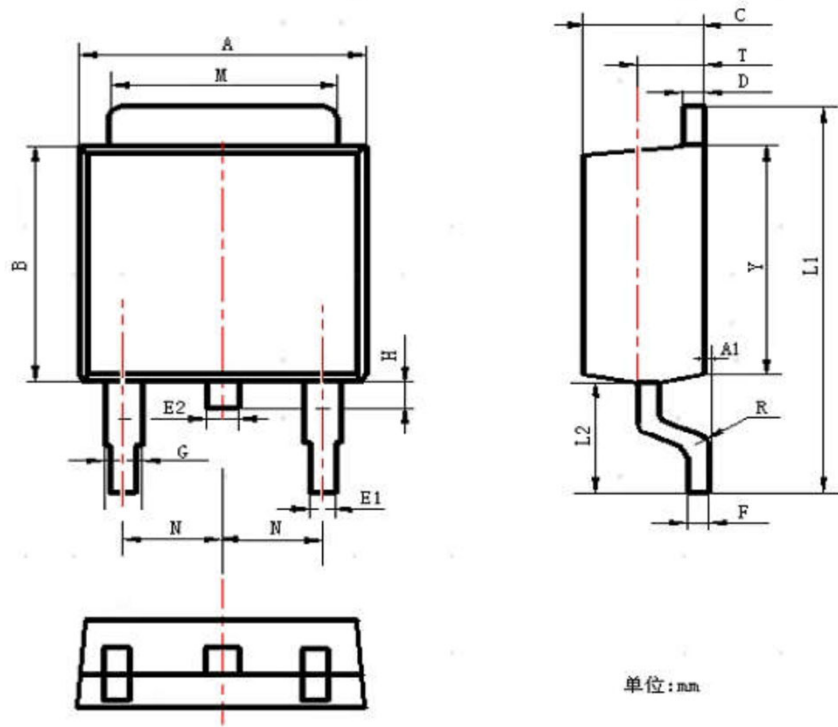


Figure 21. Diode Recovery Waveform




Product Dimension (TO-252)



单位: mm

SYMBOL	Millimeter		
	Min	Nom	Max
A	6.30	6.60	6.90
A1	0	0.80	0.16
B	5.70	6.00	6.30
C	2.10	2.30	2.50
D	0.30	0.60	0.90
E1	0.60	0.75	0.90
F	0.30	0.45	0.60
G	0.70	0.95	1.20
L1	9.30	9.90	10.50
L2	2.50	2.80	3.10
H	0.40	0.70	1.05
M	4.90	5.30	5.60
N	2.09	2.29	2.49


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