

General Description

The RST7578 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications.

Features

- $V_{DS}=75V$; $I_D=78A@V_{GS}=10V$;
 $R_{DS(ON)}<8.5m\Omega @V_{GS}=10V$
- Special process technology for high ESD capability
- Special designed for Convertors and power controls
- High density cell design for ultra low R_{dson}
- Fully characterized Avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

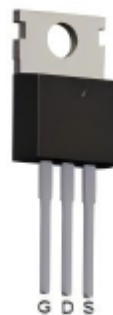
Application

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

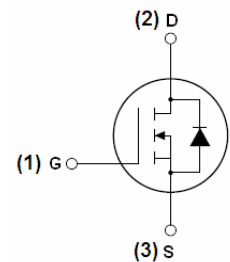
Product Summary

BV_{DSS}	typ.	84	V
$R_{DS(ON)}$	typ.	7.0	m Ω
	max.	8.5	m Ω
I_D		78	A

100% UIS TESTED!



TO-220-3L top view



Schematic diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
RST7578	RST7578	TO-220-3L	-	-	-

Table 1. Absolute Maximum Ratings ($T_C=25^\circ C$)

Parameter	Symbol	Value	Unit
Drain-Source Voltage ($V_{GS}=0V$)	V_{DS}	75	V
Gate-Source Voltage ($V_{DS}=0V$)	V_{GS}	± 20	V
Drain Current (DC) at $T_C=25^\circ C$	$I_{D(DC)}$	78	A
Drain Current (DC) at $T_C=100^\circ C$	$I_{D(DC)}$	55	A
Drain Current-Continuous@ Current-Pulsed (Note 1)	$I_{DM(pluse)}$	300	A
Peak diode recovery voltage	dv/dt	30	V/ns
Maximum Power Dissipation($T_C=25^\circ C$)	P_D	160	W
Derating factor		1.07	W/ $^\circ C$
Single pulse avalanche energy (Note 2)	E_{AS}	550	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature

2.EAS condition: $T_J=25^\circ C, V_{DD}=37.5V, V_G=10V, L=0.5mH$

Pb Free Product
Table 2. Thermal Characteristic

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case (Maximum)	R_{thJC}	0.94	$^{\circ}\text{C/W}$
Thermal Resistance, Junction-to-Ambient (Maximum)	R_{thJA}	63	$^{\circ}\text{C/W}$

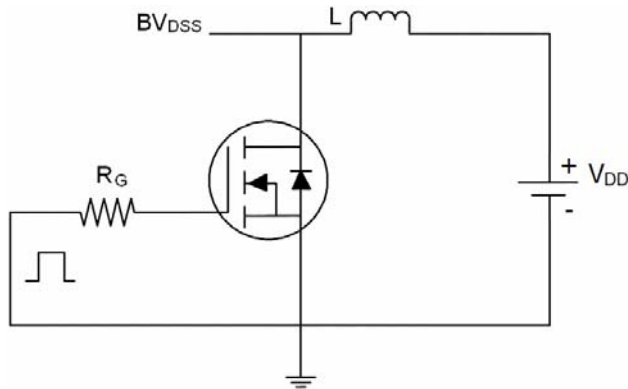
Table 3. Electrical Characteristics ($T_c=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
On/off states						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	75	84	-	V
Zero Gate Voltage Drain Current(Tc=25℃)	I _{DSS}	V _{DS} =75V,V _{GS} =0V	-	-	1	μA
Zero Gate Voltage Drain Current(Tc=125℃)	I _{DSS}	V _{DS} =75V,V _{GS} =0V	-	-	10	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V,V _{DS} =0V	-	-	±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	2	2.85	4	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =40A	-	7	8.5	mΩ
Dynamic Characteristics						
Forward Transconductance	g _{FS}	V _{DS} =5V,I _D =30A	-	60	-	S
Input Capacitance	C _{iss}	V _{DS} =25V,V _{GS} =0V, F=1.0MHz	-	3400	-	PF
Output Capacitance	C _{oss}		-	290	-	PF
Reverse Transfer Capacitance	C _{rss}		-	221	-	PF
Total Gate Charge	Q _g	V _{DS} =30V,I _D =30A, V _{GS} =10V	-	94	-	nC
Gate-Source Charge	Q _{gs}		-	16	-	nC
Gate-Drain Charge	Q _{gd}		-	24	-	nC
Switching times						
Turn-on Delay Time	t _{d(on)}	V _{DD} =30V,I _D =2A,R _L =15Ω V _{GS} =10V,R _G =2.5Ω	-	15	-	nS
Turn-on Rise Time	t _r		-	11	-	nS
Turn-Off Delay Time	t _{d(off)}		-	52	-	nS
Turn-Off Fall Time	t _f		-	13	-	nS
Source- Drain Diode Characteristics						
Source-drain current(Body Diode)	I _{SD}		-	-	78	A
Pulsed Source-drain current(Body Diode)	I _{SDM}		-	-	312	A
Forward on voltage ^(Note 1)	V _{SD}	Tj=25℃,I _{SD} =40A,V _{GS} =0V	-	-	1.2	V
Reverse Recovery Time ^(Note 1)	t _{rr}	Tj=25℃,I _F =75A,di/dt=100A/μs	-	-	33	nS
Reverse Recovery Charge ^(Note 1)	Q _{rr}		-	-	54	nC
Forward Turn-on Time	t _{on}	Intrinsic turn-on time is negligible(turn-on is dominated by L _S +L _D)				

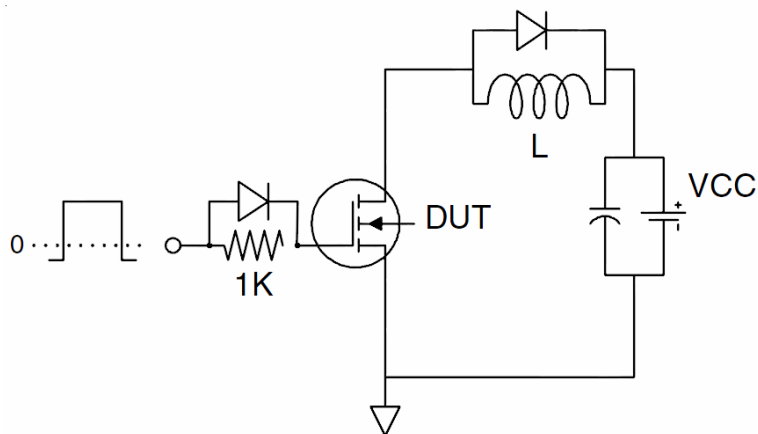
Notes 1. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 1.5\%$, $R_G=25\Omega$, Starting $T_j=25^{\circ}\text{C}$

Test Circuit

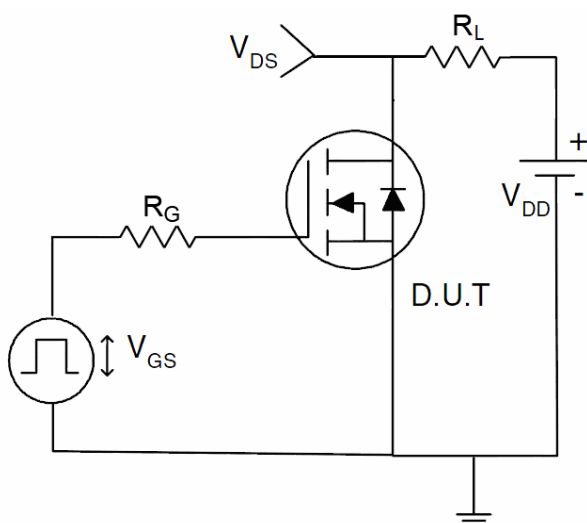
1) E_{AS} test circuit



2) Gate charge test circuit



3) Switch Time Test Circuit



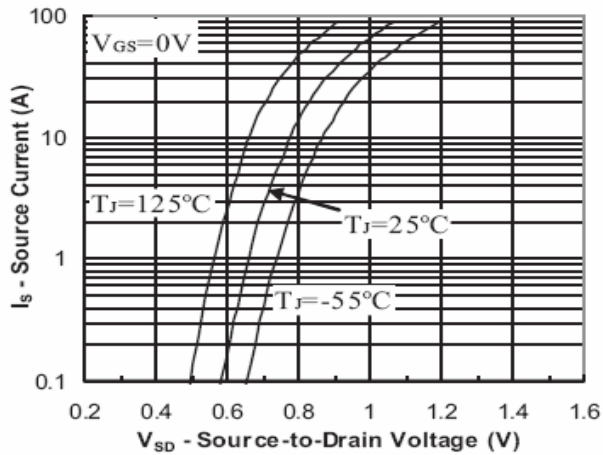
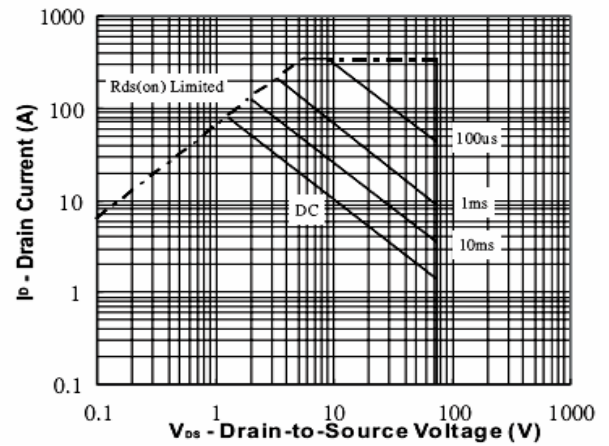
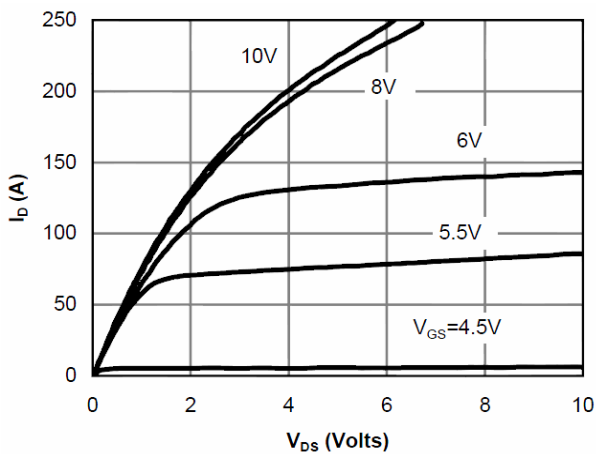
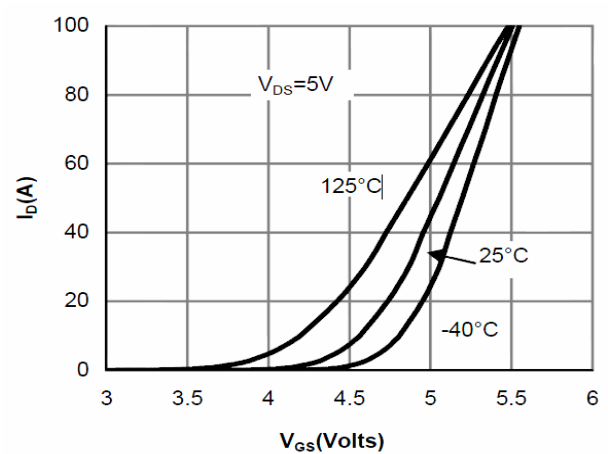
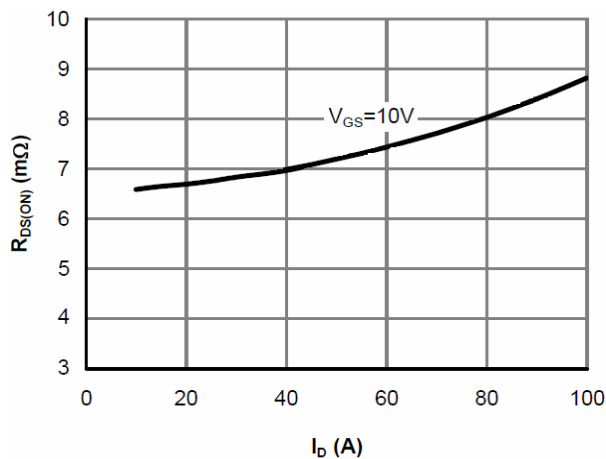
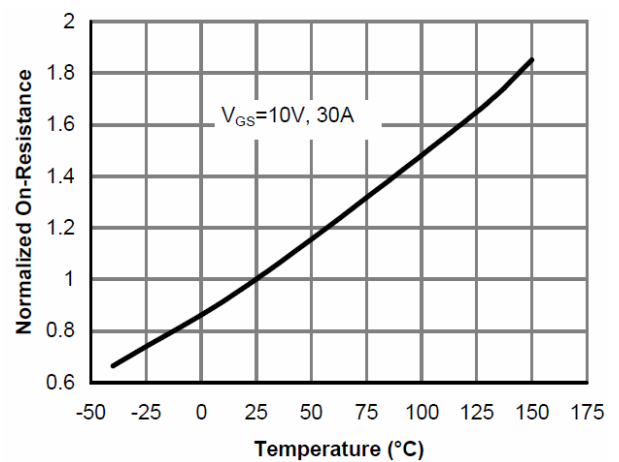
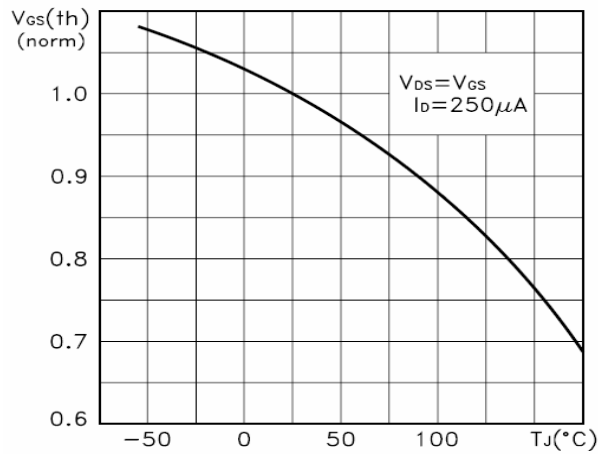
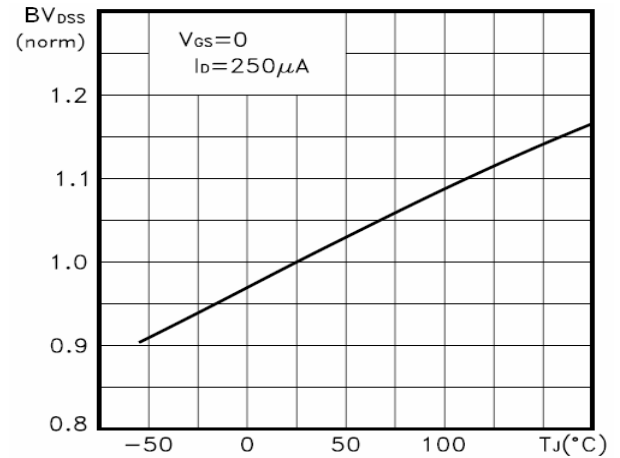
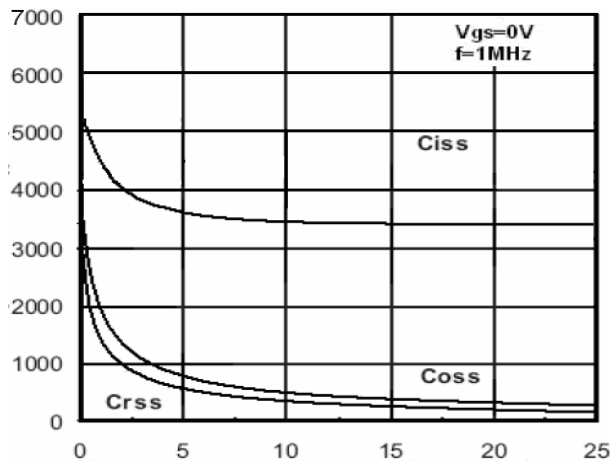
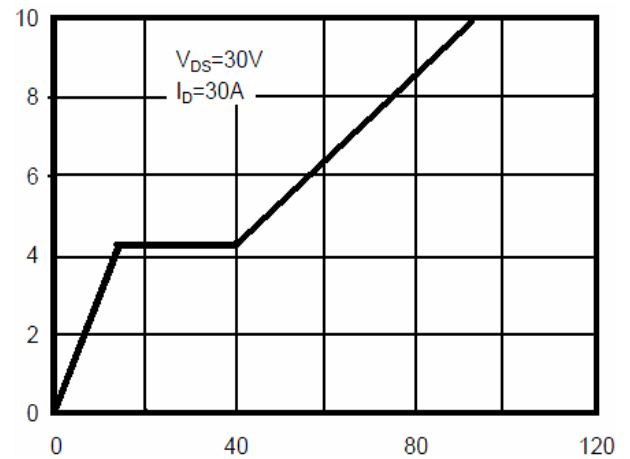
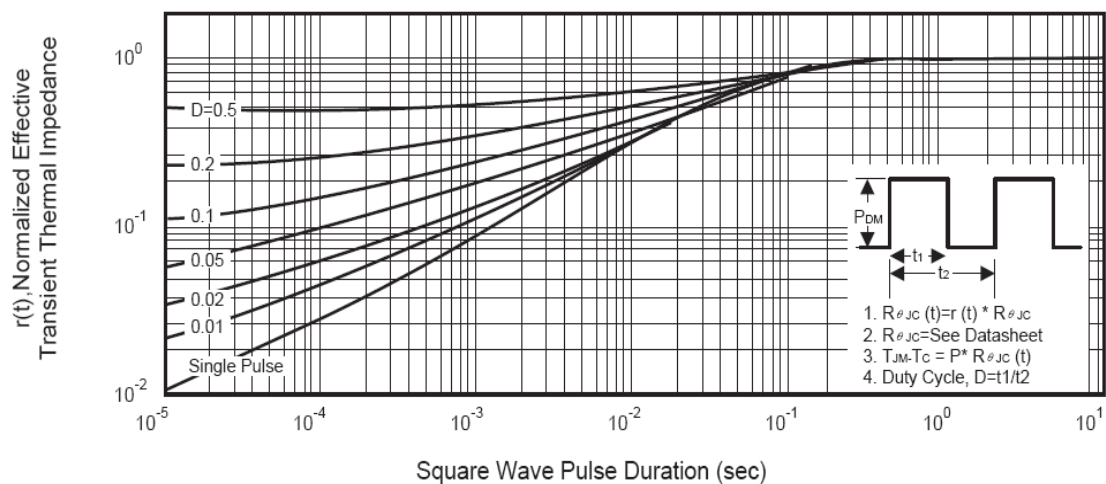
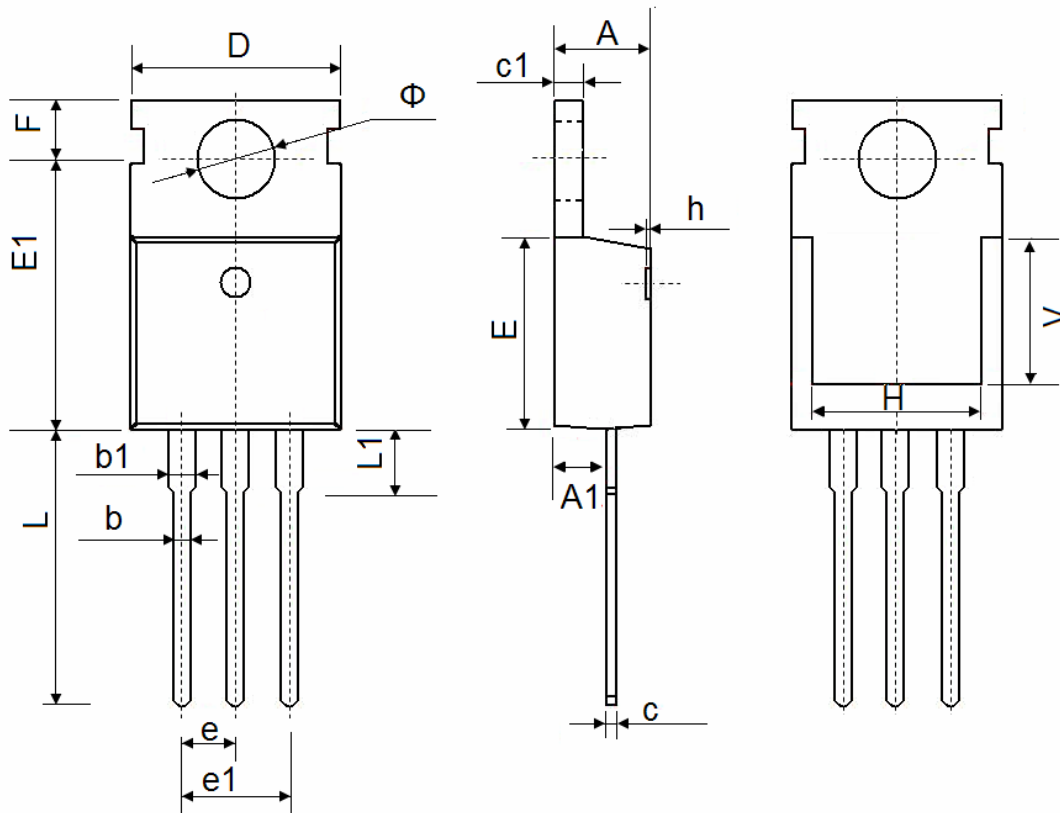
Typical Electrical and Thermal Characteristics (curves)
Figure1. Safe operating area

Figure2. Source-Drain Diode Forward Voltage

Figure3. Output characteristics

Figure4. Transfer characteristics

Figure5. Static drain-source on resistance

Figure6. $R_{DS(on)}$ vs Junction Temperature


Figure7. BV_{DS} vs Junction Temperature

Figure8. $V_{GS(th)}$ vs Junction Temperature

Figure9. Capacitance

Figure10. Gate charge waveforms

Figure11. Normalized Maximum Transient Thermal Impedance


TO-220-3L Package Information


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.9500	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	7.500 REF.		0.295 REF.	
Φ	3.400	3.800	0.134	0.150