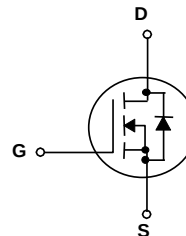
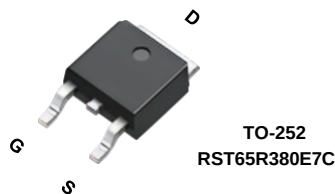


General Description

This Power MOSFET is produced using Rsttek's advanced Superjunction MOSFET technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switched mode power supplies.

Features

- 13A, 650V, $R_{DS(on)typ} = 321m\Omega$ @ $V_{GS} = 10V$
- Low gate charge(typ. $Q_g = 18nC$)
- High ruggedness
- Ultra fast switching
- 100% avalanche tested
- Improved dv/dt capability



Absolute Maximum Ratings

$T_C = 25^\circ C$ unless otherwise noted

Symbol	Parameter	RST65R380E7C	Units
V_{DSS}	Drain-Source Voltage	650	V
I_D	Drain Current ¹⁾ - Continuous ($T_C = 25^\circ C$)	13	A
	- Continuous ($T_C = 100^\circ C$)	8	A
I_{DM}	Drain Current ¹⁾ - Pulsed	39	A
V_{GSS}	Gate-Source Voltage - Static	± 20	V
	- AC ($f > 1Hz$)	± 30	
E_{AS}	Single Pulsed Avalanche Energy ²⁾	88	mJ
P_D	Power Dissipation ($T_C = 25^\circ C$)	111	W
	- Derate above $25^\circ C$	0.89	W/ $^\circ C$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ C$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	260	$^\circ C$

Thermal Characteristics

Symbol	Parameter	RST65R380E7C	Units
R_{thJC}	Thermal Resistance, Junction to Case	1.13	$^\circ C/W$
R_{thJA}	Thermal Resistance, Junction to Ambient	62	$^\circ C/W$

Package Marking

Part Number	Top Marking	Package	Packing Method	MOQ	QTY
RST65R380E7C	RST65R380E7C	TO-252	Tape	2500	25000

Electrical Characteristics

 $T_C = 25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	650	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 650\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.5	--	4.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 4\text{ A}$	--	321	380	m Ω

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 400\text{ V}, V_{GS} = 0\text{ V},$ $f = 100\text{ kHz}$	--	640	--	pF
C_{oss}	Output Capacitance		--	18	--	pF
C_{rss}	Reverse Transfer Capacitance		--	1.3	--	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{GS} = 10\text{ V}, V_{DS} = 500\text{ V},$ $R_G = 10\text{ }\Omega, I_D = 5\text{ A}$	--	30	--	ns
t_r	Turn-On Rise Time		--	36	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	37	--	ns
t_f	Turn-Off Fall Time		--	32	--	ns
Q_g	Total Gate Charge	$V_{DS} = 400\text{ V}, I_D = 4\text{ A},$ $V_{GS} = 10\text{ V}$	--	18.3	--	nC
Q_{gs}	Gate-Source Charge		--	3.8	--	nC
Q_{gd}	Gate-Drain Charge		--	10.3	--	nC
R_G	Gate Resistance	$f = 1\text{ MHz}$	--	7.5	--	Ω

Drain-Source Diode Characteristics

I_S	Maximum Continuous Drain-Source Diode Forward Current	--	--	13	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current	--	--	39	A
V_{SD}	Drain to Source Diode Forward Voltage, $V_{GS} = 0\text{ V}, I_{SD} = 4\text{ A}, T_J = 25^{\circ}\text{C}$	--	0.8	1.2	V
t_{rr}	Reverse Recovery Time	$V_{DS} = 500\text{ V}, I_S = 5\text{ A},$ $di_F / dt = 100\text{ A}/\mu\text{s}$	--	187	ns
Q_{rr}	Reverse Recovery Charge		--	2	μC

Notes:

- Drain current limited by maximum junction temperature.
- EAS conditions: $T_J = 25^{\circ}\text{C}, V_{DD} = 50\text{ V}, V_G = 10\text{ V}, L = 10\text{ mH}$.
- These curves are based on the junction-to-case thermal impedance $R_{\theta JC}$, assuming maximum junction temperature is 150°C . These curves provide a single pulse rating.

N- Channel Typical Characteristics

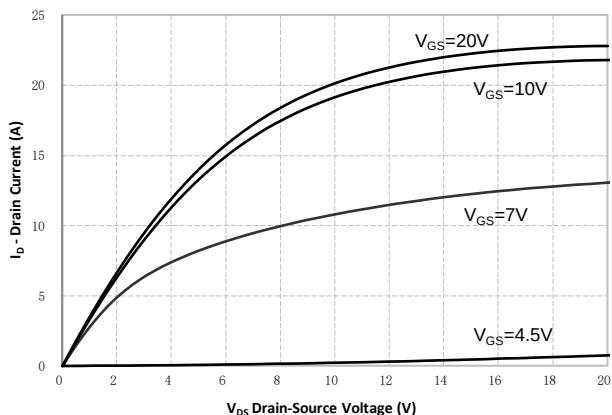


Figure 1. On-Region Characteristics

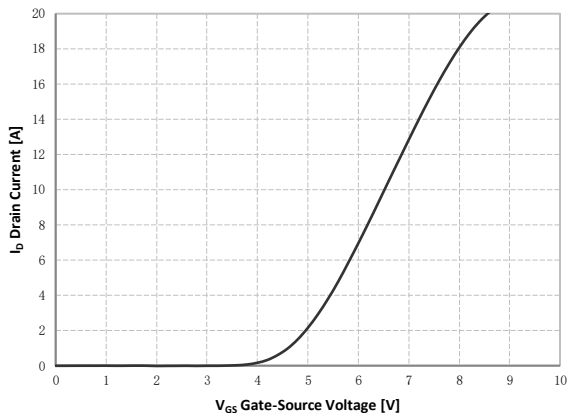


Figure 2. Transfer Characteristics

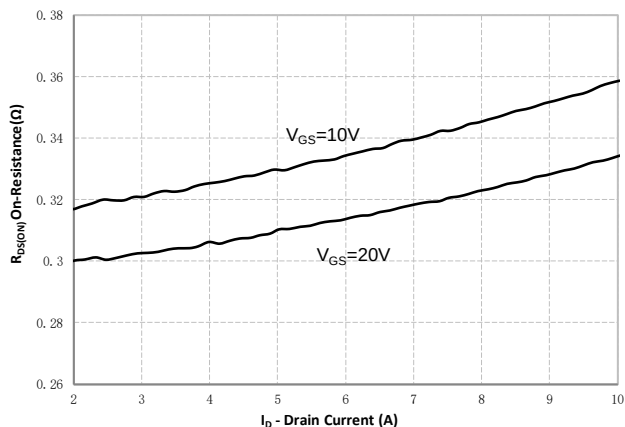


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

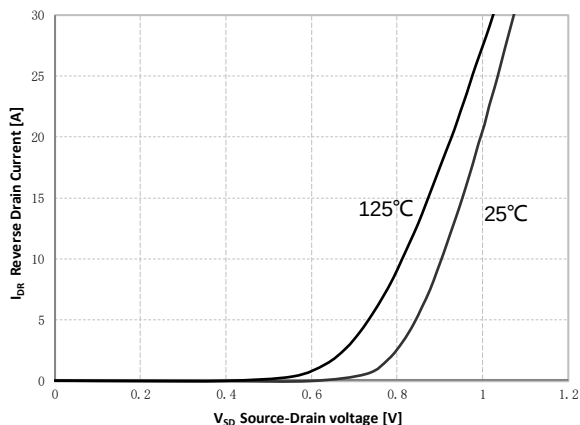


Figure 4. Body Diode Forward Voltage Variation with Current

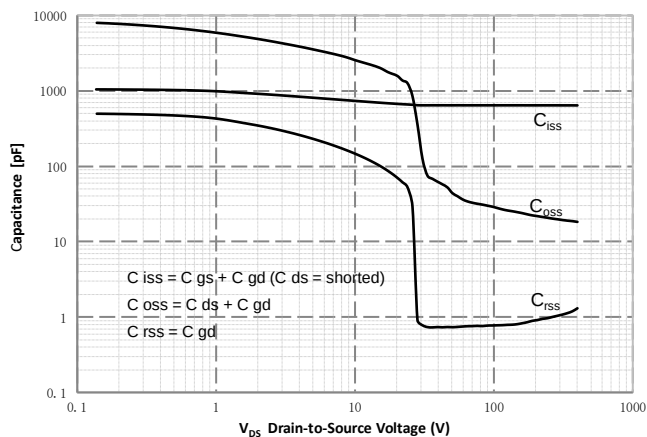


Figure 5. Capacitance Characteristics

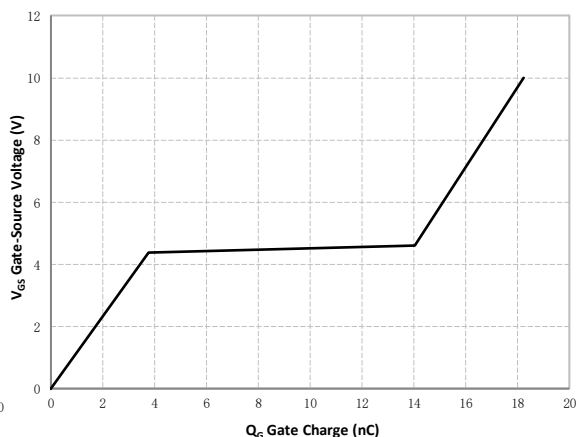


Figure 6. Gate Charge Characteristics

N- Channel Typical Characteristics (Continued)

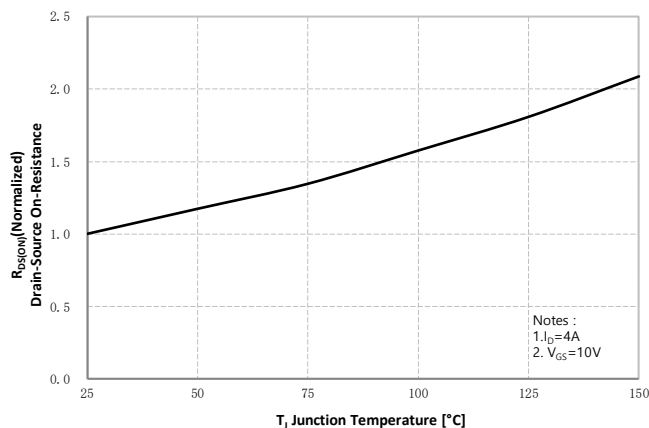


Figure 7. On-Resistance Variation vs Temperature

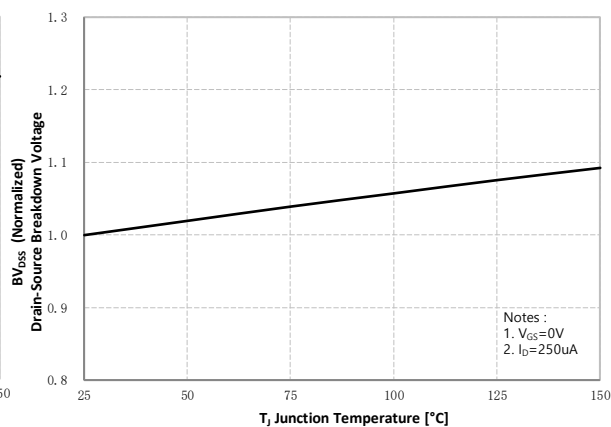


Figure 8. Breakdown Voltage Variation vs Temperature

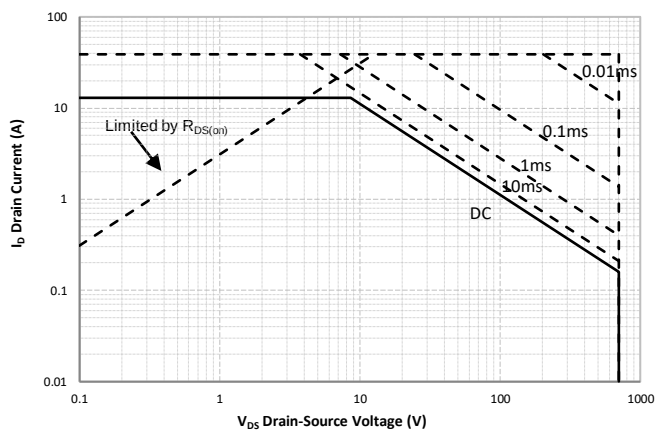


Figure 9. Maximum Safe Operating Area³⁾

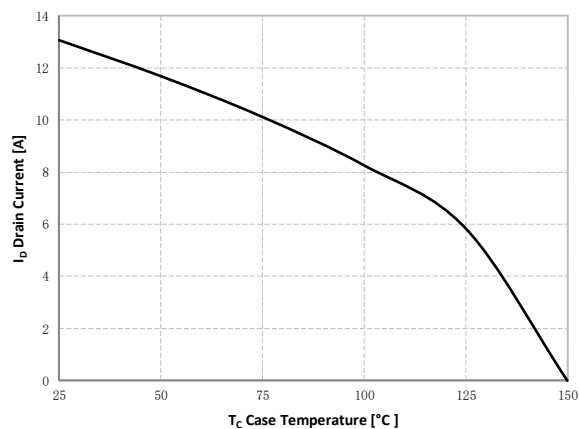


Figure 10. Maximum Continuous Drain Current vs Case Temperature

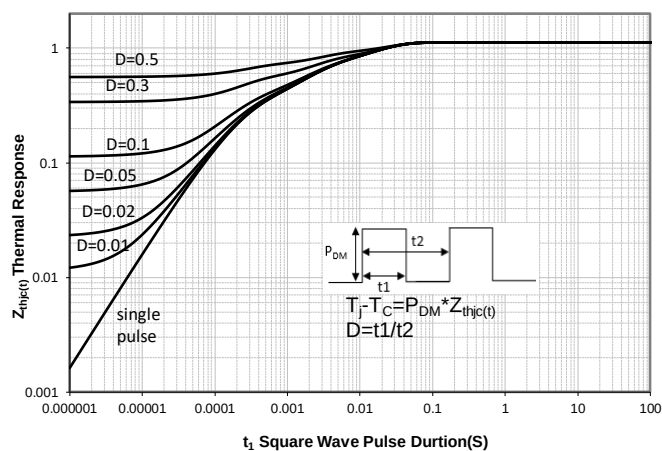
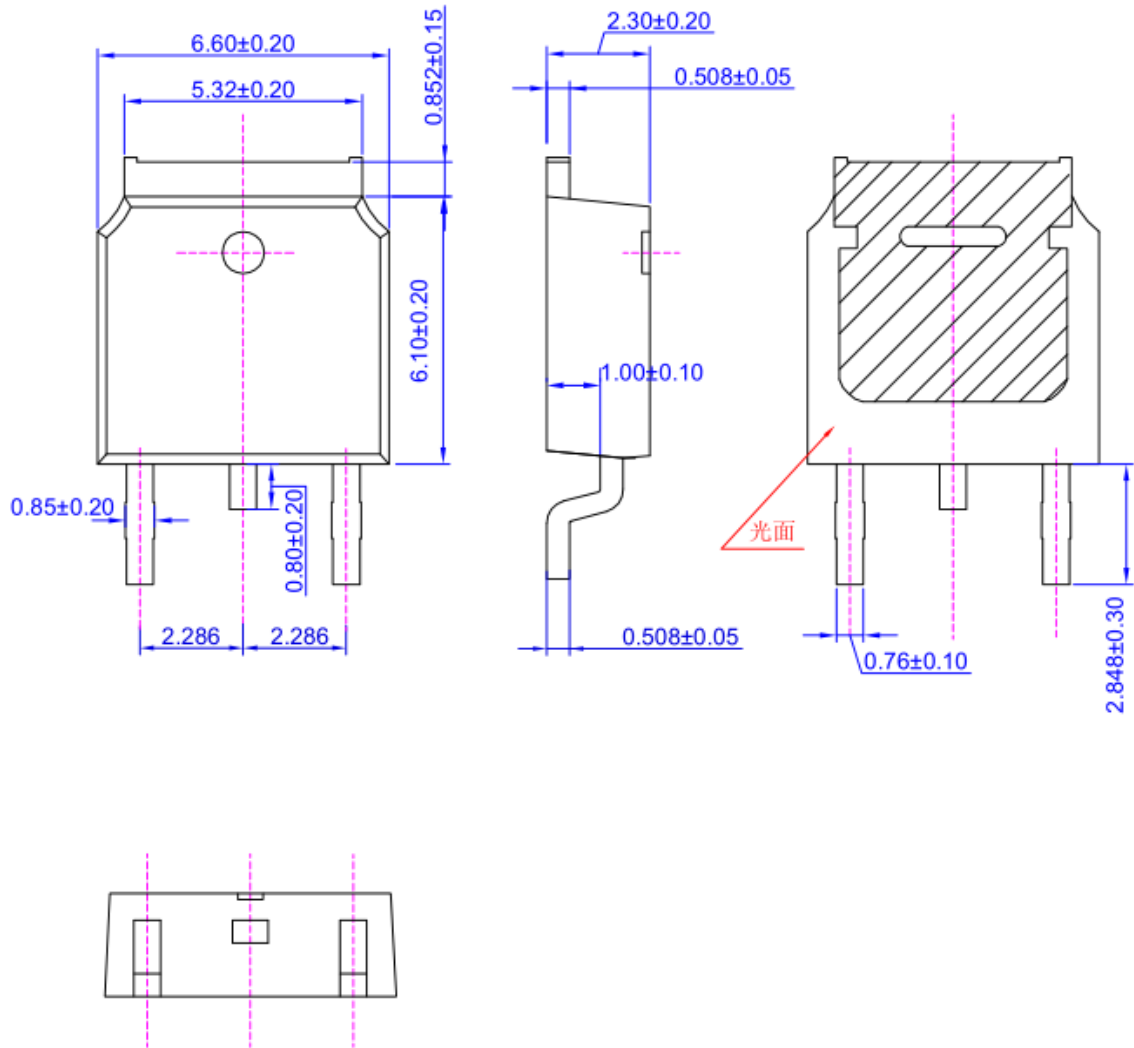


Figure 11. Transient Thermal Response Curve

TO-252 OUTLINE



NOTE:

1. The plastic package is not marked as smooth surface $Ra=0.1$; Subglossy surface $Ra=0.8$
2. Undeclared tolerance ± 0.25 , Unmarked fillet $R_{max}=0.25$