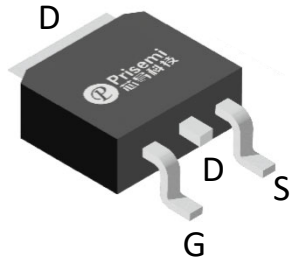
Prisemi®

PSICMDP65R180

SiC MOSFET

Description

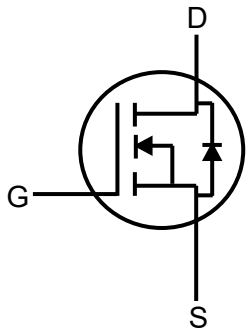
Product Summary		
V_{DS}(V)	$R_{DS(on)}$(mΩ)	I_D(A)
750	180@V_{GS}=15V	20



TO-252 (Bottom View)

Feature

- High Speed Switching
- High Blocking Voltage with Low $R_{DS(on)}$
- Easy to Parallel
- Simple to Drive
- RoHS Compliant



Schematic diagram

Applications

- Power Factor Correction Modules
- Switch Mode Power Supplies
- DC-AC Inverters
- High Voltage DC/DC Converters

Absolute maximum rating@25℃

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	750	V
Gate-Source Voltage （Absolute maximum values）		V_{GSmax}	-10/+22	V
Gate-Source Voltage (Recommended operational values)		V_{GSop}	0/+15	V
Continuous Drain Current	T_C=25℃	I_D	20	A
	T_C=100℃		14.4	
Pulsed drain current (TC = 25°C, tp limited by Tjmax)		$I_{D\ pulse}$	34.5	A
Power dissipation		P_{tot}	82	W
Single Pulse Avalanche Energy		E_{AS}	28	mJ
Operating Junction Temperature		T_J	-55 to +175	℃
Storage Temperature		T_{STG}	-55 to +175	℃

Thermal Resistance

Parameter	Symbol	Min	Typ	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	-	1.83	2.2	℃/W
Soldering Temperature, Wave Soldering only Allowed at Leads 1.6mm from Case for 10s	T_{SOLD}	-	260	-	℃

Electrical characteristics per line@25℃ (unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Statistic Characteristics							
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0V,I_D = 100μA		750	-	-	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}= 650V, V_{GS} = 0V	T_j=25°C	-	0.1	10	μA
			T_j=175°C	-	1	-	
Gate-Source Leakage Current	I_{GSS}	V_{GS} = 22V, V_{DS} = 0V		-	-	100	nA
Source-Gate Leakage Current	I_{SGS}	V_{GS} = -10V, V_{DS} = 0V		-	-	100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 3.5mA	T_j=25°C	2.7	-	4.5	V
			T_j=175°C	-	2.3	-	
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS} = 15V, I_D = 10A	T_j=25°C	-	160	208	mΩ
			T_j=175°C	-	164	-	
		V_{GS} = 18V, I_D = 10A	T_j=25°C	-	120	156	
			T_j=175°C	-	135	-	
Dynamic Characteristics							
Input Capacitance	C_{lss}	V_{DS} = 400V, f=1MHz, V_{GS}=0V		-	438	-	pF
Output Capacitance	C_{oss}			-	30	-	
Reverse Transfer Capacitance	C_{rss}			-	2.7	-	
Turn-on Delay Time	$t_{d(on)}$	V_{GS}=0/+15V, L=600μH, V_{DS}=400V, I_D=10A, $R_{G(on)}$=2.2Ω, $R_{G(off)}$=2.2Ω,		-	21.2	-	ns
Turn-on Rise Time	t_r			-	14.4	-	
Turn-Off Delay Time	$t_{d(off)}$			-	27	-	
Turn-Off Fall Time	t_f			-	14.2	-	
Turn-On Energy	E_{on}			-	106	-	mJ
Turn-Off Energy	E_{off}			-	24	-	
Total Switching Energy	E_{tot}			-	130	-	
Total Gate Charge	Q_g	V_{GS}=0/+15V, V_{DS}=400V, I_D=10A		-	14.5	-	nC
Gate-Source Charge	Q_{gs}			-	5.5	-	
Gate-Drain Charge	Q_{gd}			-	2.2	-	
Internal Gate Resistance	$R_{G(int)}$	V_{AC}=25mV, f=1MHz		-	36	-	Ω

Electrical characteristics per line@25℃ (unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Reverse Diode Characteristics							
Body Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_{SD}=5A	T_j=25°C	-	3.5	-	V
			T_j=175°C	-	3.1	-	
Continuous Diode Forward Current	I_S	T_C=25°C		-	17	-	A
		T_C=100°C		-	9	-	
Peak Reverse Recovery Current	I_{rrm}	V_{DS}=400V, V_{GS}=0V, I_{SD}=10A, di/dt=1500A/μs		-	4.8	-	A
Body Diode Reverse Recovery Charge	Q_{rr}			-	26	-	nC
Body Diode Reverse Recovery Time	t_{rr}			-	6.9	-	ns
Reverse Recovery Energy	E_{rr}				0.24		μJ

Typical Characteristics

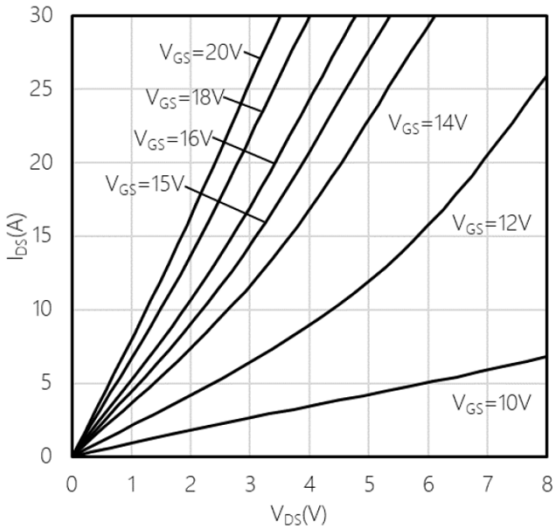


Fig 1. Output Characteristic T_J = -55 ℃

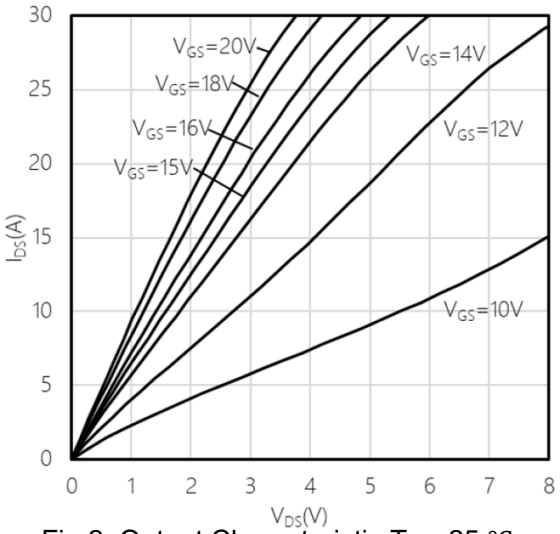


Fig 2. Output Characteristic T_J = 25 ℃

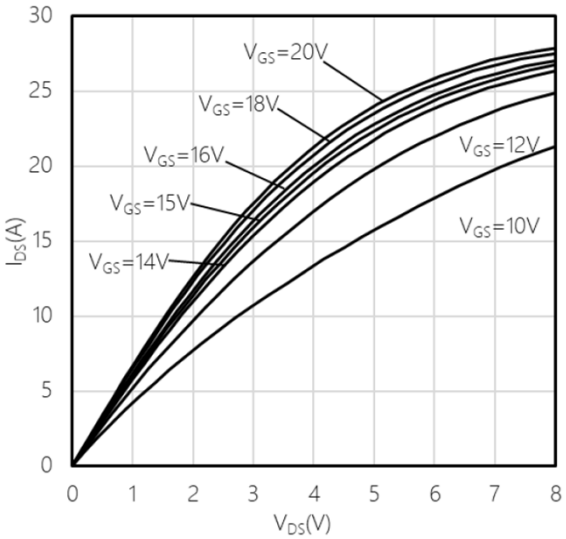


Fig 3. Output Characteristic T_J = 175 ℃

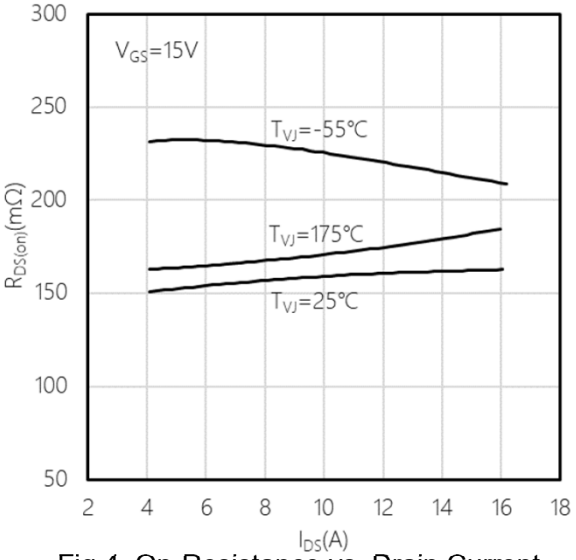


Fig 4. On-Resistance vs. Drain Current For Various Temperatures, V_{GS} = 15V

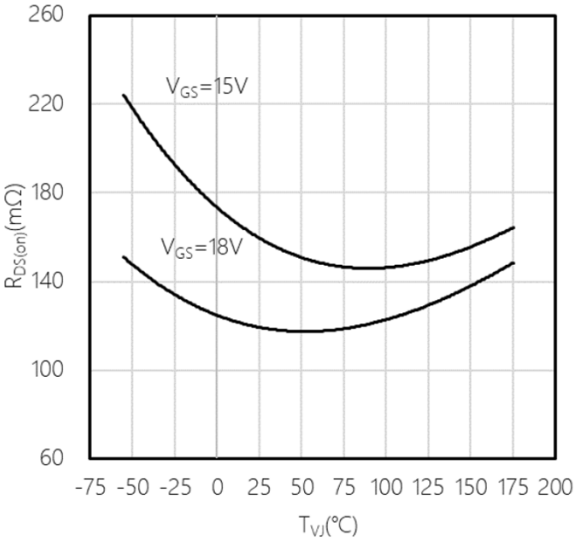


Fig 5. On-Resistance vs. Temperature For Various Gate Voltage, I_{DS} =10 A

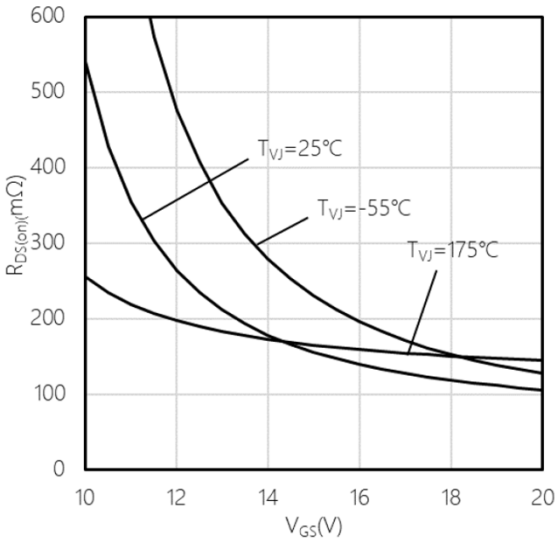


Fig 6. On-Resistance vs. Gate Voltage For Various Temperatures , I_{DS} =10 A

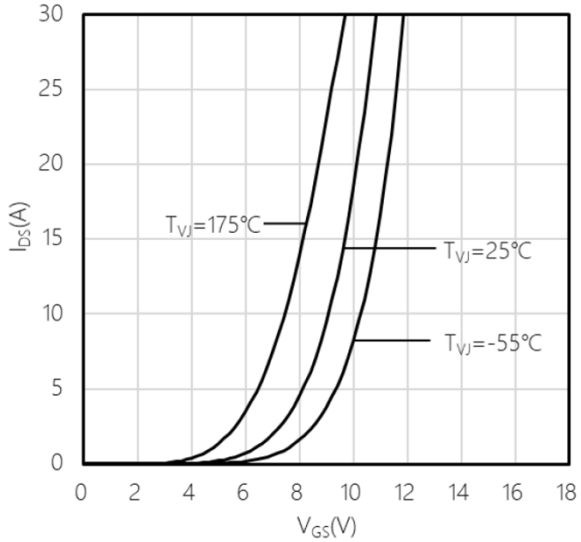


Fig 7. Transfer Characteristic For Various Temperatures V_{DS} = 20V

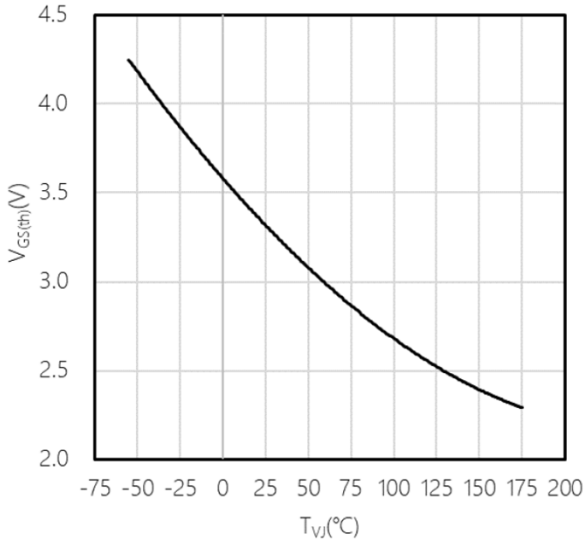


Fig 8. Threshold Voltage vs. Temperature I_{DS} = 3.5 mA

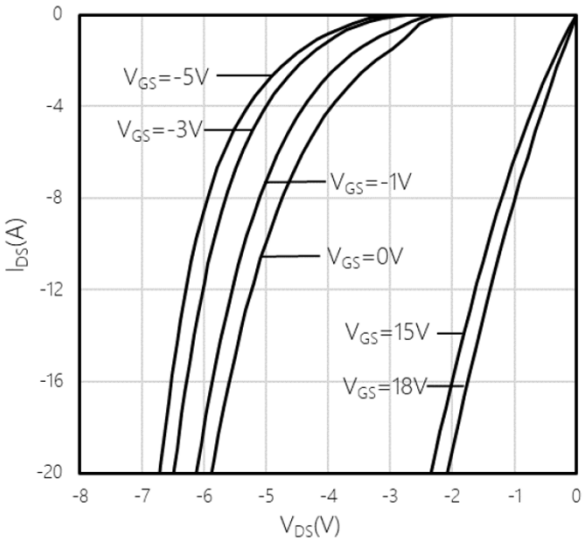


Fig 9. 3rd Quadrant Characteristic T_J = -55 ℃

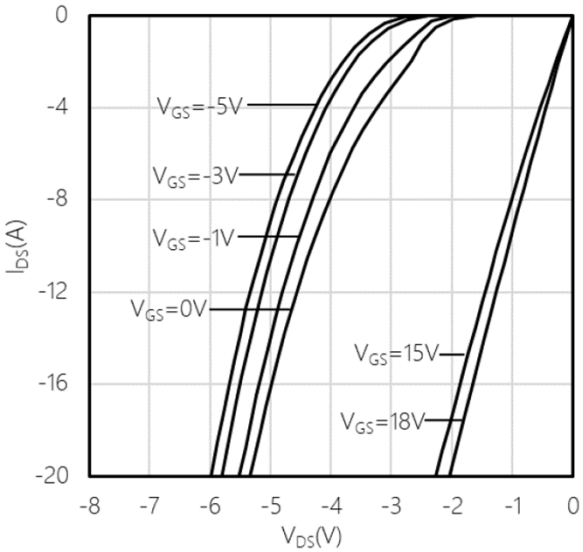


Fig10. 3rd Quadrant Characteristic T_J = 25 ℃

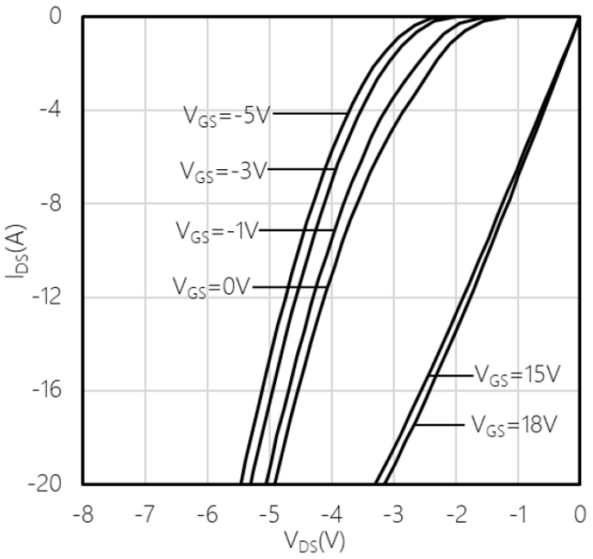


Fig11. 3rd Quadrant Characteristic T_J = 175 ℃

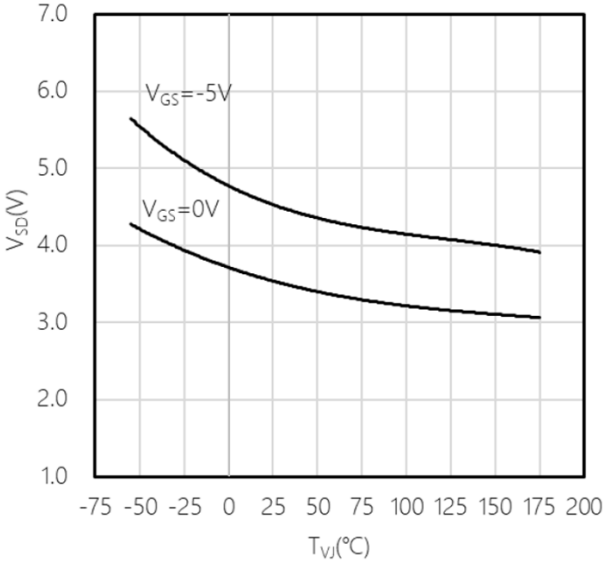


Fig 12. Body Diode Characteristic vs. Temperature For Various Gate Voltage I_{SD} = 5 A

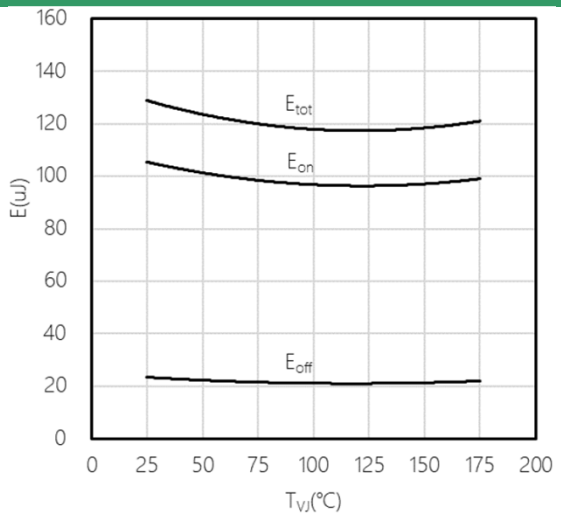


Fig 13. Switching Energy vs.Temperature, 2nd device own body diode: V_{GS} = 0 V, V_{DS} = 400 V, $R_{G(ext)}$ = 2.2 Ω, V_{GS} = 0V / 15 V, I_{DS} = 10 A

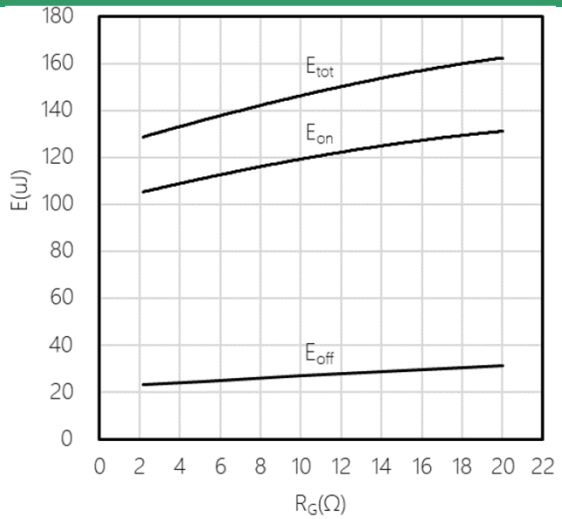


Fig 14. Switching Energy vs.Rg, 2nd device own body diode: V_{GS} = 0 V, V_{DS} = 400 V, $R_{G(ext)}$ = 2.2 Ω, V_{GS} = 0V / 15 V, I_{DS} = 10 A , T_J = 25 °C

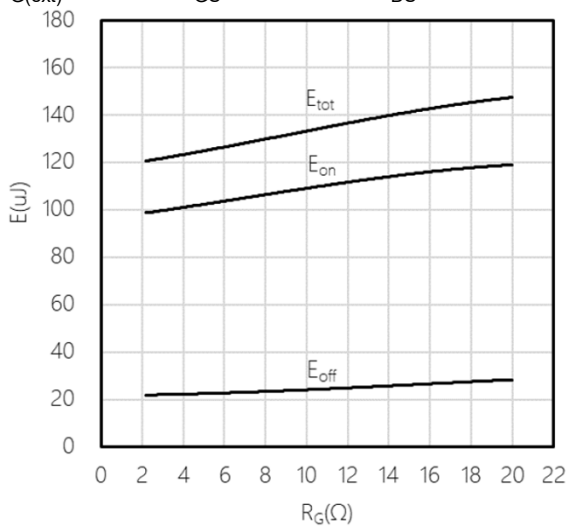


Fig 15. Switching energy vs.Rg, 2nd device own body diode: V_{GS} = 0 V, V_{DS} = 400 V, $R_{G(ext)}$ = 2.2 Ω, V_{GS} = 0V / 15 V, I_{DS} = 10 A, T_J = 175 °C

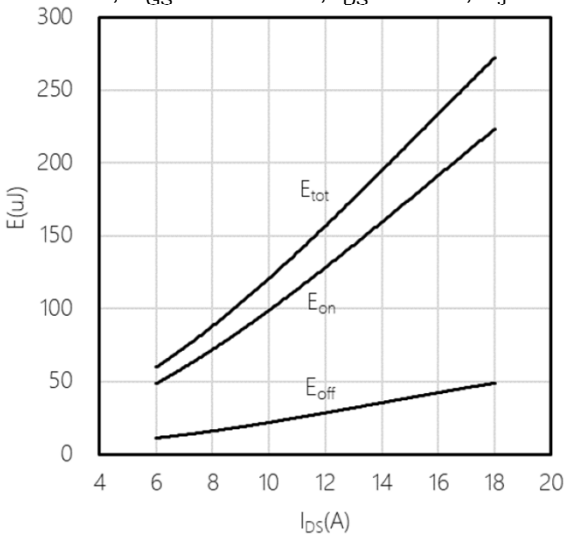


Fig 16. Switching energy vs.I_{DS}, 2nd device own body diode: V_{GS} = 0 V, V_{DS} = 400 V, $R_{G(ext)}$ = 2.2 Ω, V_{GS} = 0V / 15 V, I_{DS} = 10 A, T_J = 25 °C

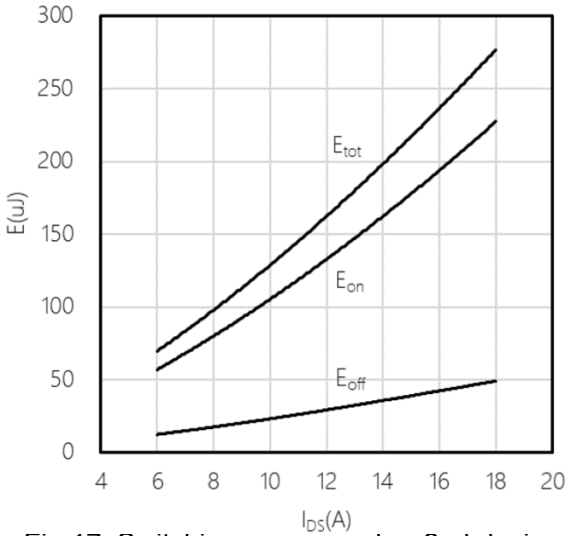


Fig 17. Switching energy vs.I_{DS}, 2nd device own body diode: V_{GS} = 0 V, V_{DS} = 400 V, $R_{G(ext)}$ = 2.2 Ω, V_{GS} = 0V / 15 V, I_{DS} = 10 A, T_J = 175 °C

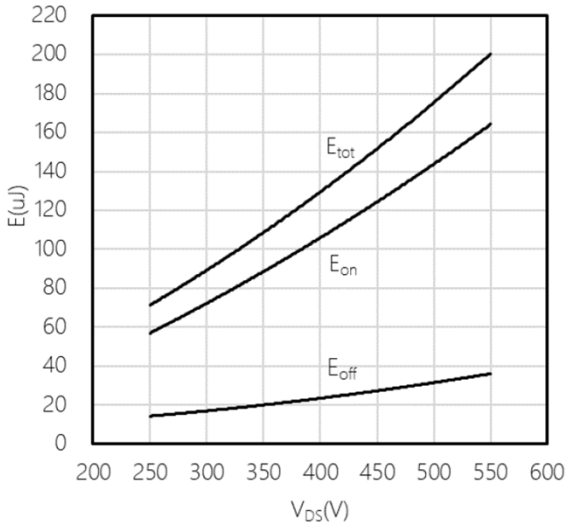


Fig 18. Switching energy vs.V_{DS}, 2nd device own body diode: V_{GS} = 0 V, V_{DS} = 400 V, $R_{G(ext)}$ = 2.2 Ω, V_{GS} = 0V / 15 V, I_{DS} = 10 A, T_J = 25 °C

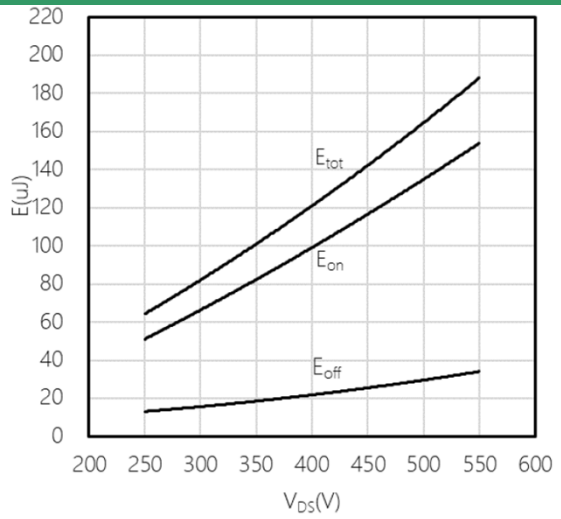


Fig 19. Switching energy vs.V_{DS}, 2nd device own body diode: V_{GS} = 0 V, V_{DS} = 400 V, $R_{G(ext)}$ = 2.2 Ω, V_{GS} = 0V / 15 V, I_{DS} = 7 A, T_J = 175 °C

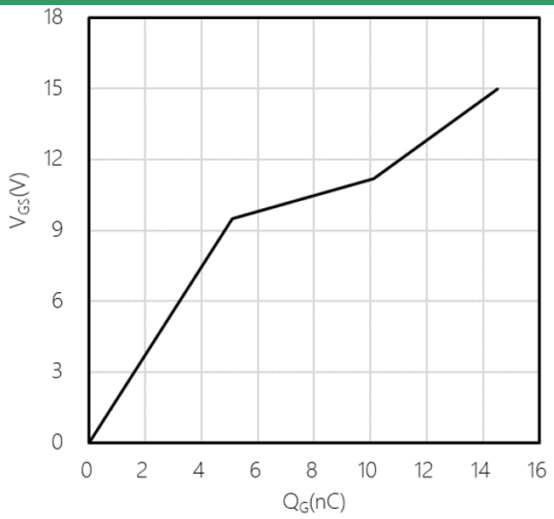


Fig 20. Gate Charge Characteristics

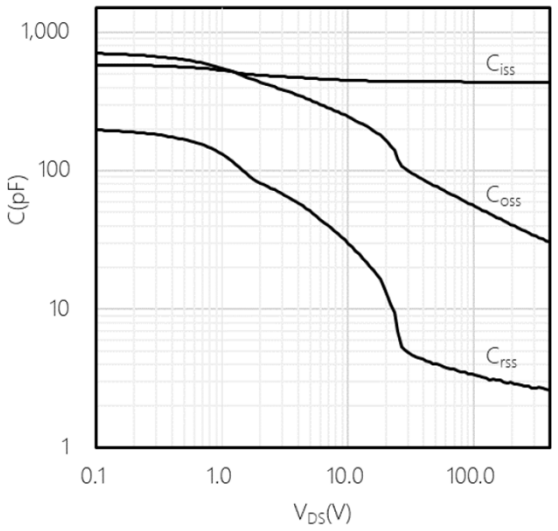


Fig 21. Capacitance vs. Drain-Source V_{GS}=0V, f=1MHz

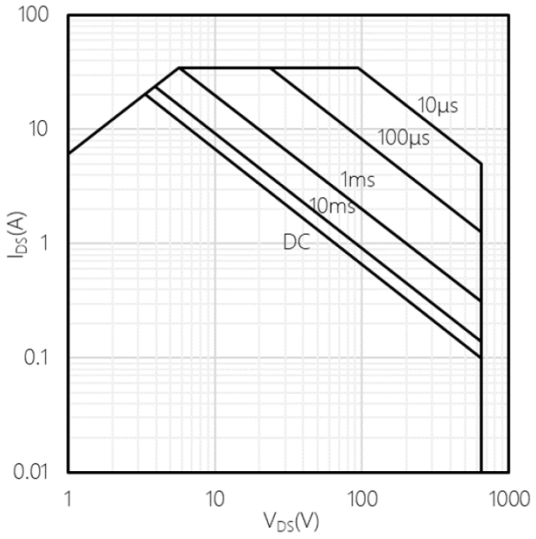


Fig 22. Safe operating area (SOA) Rth(j-c) =2.37 °C/W, Single Pulse, T_J = 25°C

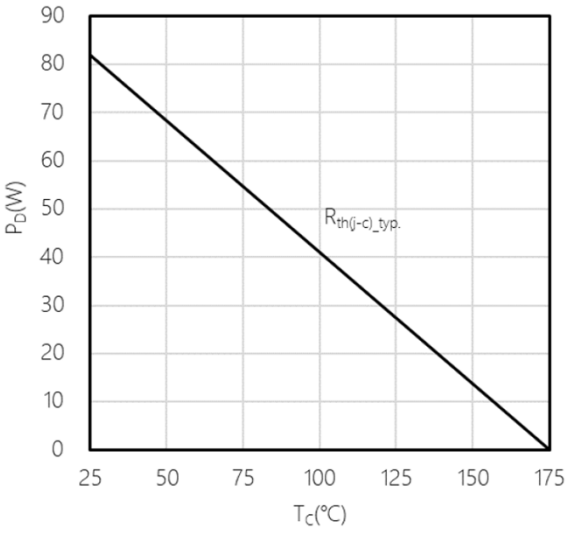


Fig 23. Power dissipation

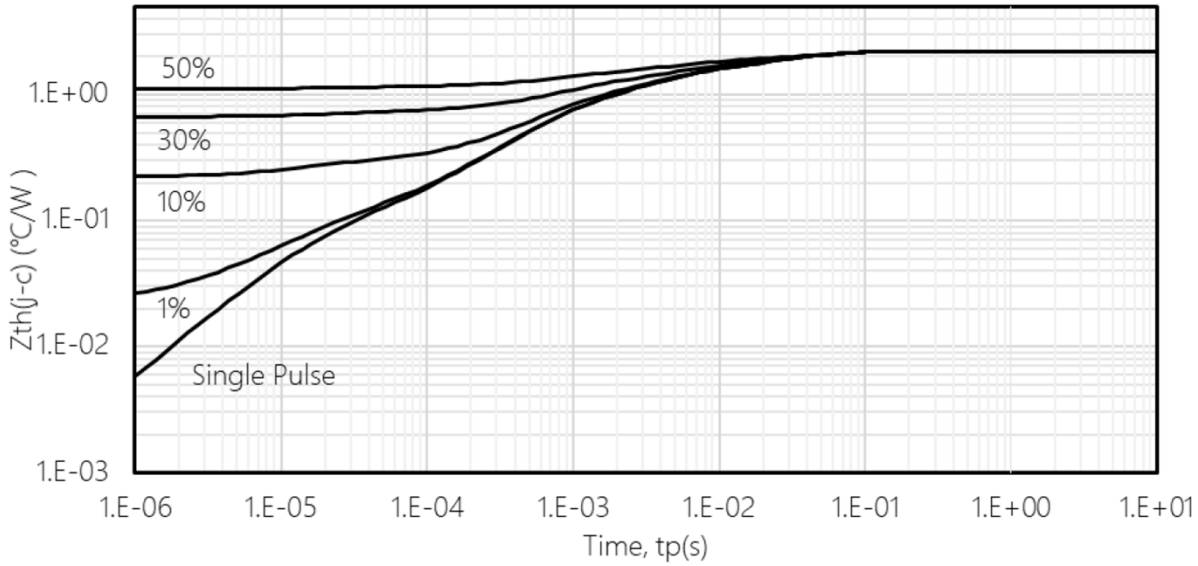
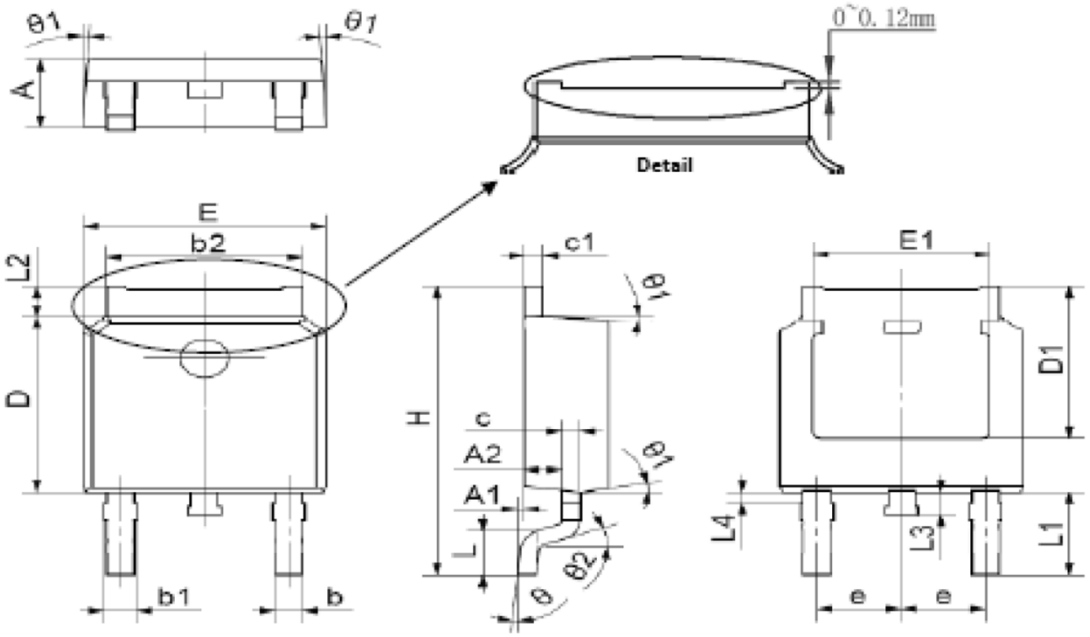


Fig 24. Transient Thermal Impedance

Product Dimension (TO-252)



SYMBOL	Millimeter		Inch	
	Min	Max	Min	Max
A	2.10	2.50	0.083	0.098
A1	0	0.15	0.000	0.006
A2	0.76	1.36	0.030	0.054
b	0.61	0.85	0.024	0.033
b1	0.71	0.91	0.028	0.036
b2	5.04	5.64	0.198	0.222
c	0.508 TYP.		0.02 TYP.	
c1	0.508 TYP.		0.02 TYP.	
D	5.8	6.3	0.228	0.248
D1	5	5.6	0.197	0.220
E	6.3	6.9	0.248	0.272
E1	4.55	5.15	0.179	0.203
e	2.286 TYP.		0.09 TYP.	
H	9.65	10.4	0.380	0.409
L	1.4	1.7	0.055	0.067
L1	2.90 REF.		0.114 REF.	
L2	0.75	1.35	0.030	0.053
L3	0.6	1.2	0.024	0.047
θ	0°	10°	0°	10°
θ1	5°	9°	5°	9°
θ2	25° REF		25° REF	

IMPORTANT NOTICE

and Prisemi® are registered trademarks of **Prisemi Electronics Co., Ltd** (Prisemi**),** Prisemi reserves the right to make changes without further notice to any products herein. Prisemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Prisemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. “Typical” parameters which may be provided in Prisemi data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including “Typicals” must be validated for each customer application by customer’s technical experts. Prisemi does not convey any license under its patent rights nor the rights of others. The products listed in this document are designed to be used with ordinary electronic equipment or devices, Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of with would directly endanger human life (such as medical instruments, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

Website: http://www.prisemi.com
For additional information, please contact your local Sales Representative.
©Copyright 2009, Prisemi Electronics
Prisemi® is a registered trademark of Prisemi Electronics.
All rights are reserved.