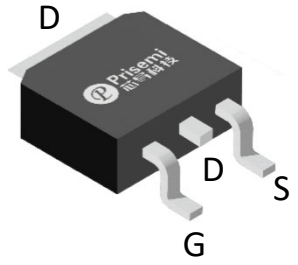
Prisemi®

PSICMDP65R540

SiC MOSFET

Description

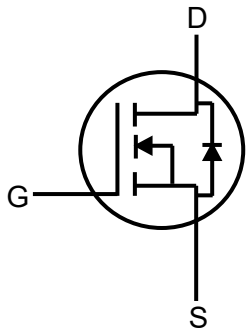
Product Summary		
V_{DS}(V)	$R_{DS(on)}$(mΩ)	I_D(A)
750	540@V_{GS}=15V	7



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	7	A
	T_C=100℃		5.8	
Pulsed drain current (TC = 25°C, tp limited by Tjmax)		$I_{D\ pulse}$	13	A
Power dissipation		P_{tot}	41	W
Single Pulse Avalanche Energy		E_{AS}	10.2	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	$R_{\theta JC}$	-	3.66	4.39	℃/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}= 750V, V_{GS} = 0V	T_j=25°C	-	0.1	20	μA
			T_j=175°C	-	3.0	-	
Gate-Source Leakage Current	I_{GSS}	V_{GS} = 22V, V_{DS} = 0V		-	-	250	nA
Source-Gate Leakage Current	I_{SGS}	V_{GS} = -10V, V_{DS} = 0V		-	-	250	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 3.5mA	T_j=25°C	3.0	3.8	-	V
			T_j=175°C	-	2.7	-	
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS} = 15V, I_D = 4A	T_j=25°C	-	500	540	mΩ
			T_j=175°C	-	509	-	
		V_{GS} = 18V, I_D = 4A	T_j=25°C	-	370	500	
			T_j=175°C	-	450	-	
Dynamic Characteristics							
Input Capacitance	C_{lss}	V_{DS} = 400V, f=1MHz, V_{GS}=0V		-	149	-	pF
Output Capacitance	C_{oss}			-	11	-	
Reverse Transfer Capacitance	C_{rss}			-	0.8	-	
Turn-on Delay Time	$t_{d(on)}$	V_{GS}=0/+15V, L=600μH, V_{DS}=400V, I_D=4A, $R_{G(on)}$=10Ω, $R_{G(off)}$=10Ω,		-	16.1	-	ns
Turn-on Rise Time	t_r			-	13.9	-	
Turn-Off Delay Time	$t_{d(off)}$			-	13.3	-	
Turn-Off Fall Time	t_f			-	13.7	-	
Turn-On Energy	E_{on}			-	45.3	-	mJ
Turn-Off Energy	E_{off}			-	3.08	-	
Total Switching Energy	E_{tot}			-	48.38	-	
Total Gate Charge	Q_g	V_{GS}=0/+15V, V_{DS}=400V, I_D=4A		-	6.7	-	nC
Gate-Source Charge	Q_{gs}			-	3.0	-	
Gate-Drain Charge	Q_{gd}			-	1.1	-	
Internal Gate Resistance	$R_{G(int)}$	V_{AC}=25mV, f=1MHz		-	35	-	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}=2A	T_j=25°C	-	3.8	-	V
			T_j=175°C	-	3.3	-	
Continuous Diode Forward Current	I_S	T_C=25°C		-	7	-	A
		T_C=100°C		-	5	-	
Peak Reverse Recovery Current	I_{rrm}	V_{GS}=0V, I_{SD}=4A, V_R=400V, di/dt=1.1kA/μs		-	4.2	-	A
Body Diode Reverse Recovery Charge	Q_{rr}			-	20	-	nC
Body Diode Reverse Recovery Time	t_{rr}			-	7.9	-	ns
Reverse Recovery Energy	E_{rr}				0.19		μJ

Typical Characteristics

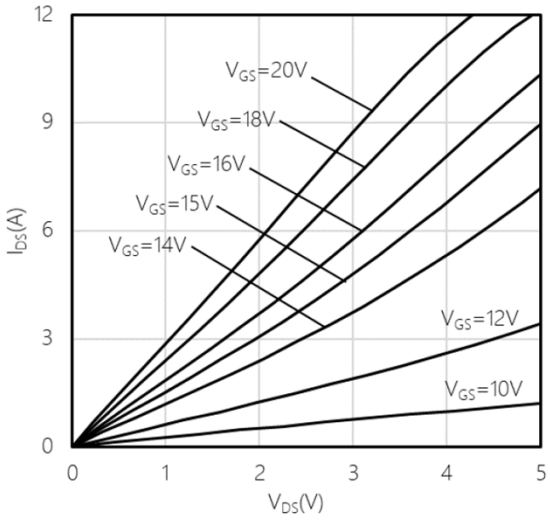


Fig 1. Output Characteristic T_J = -55 ℃

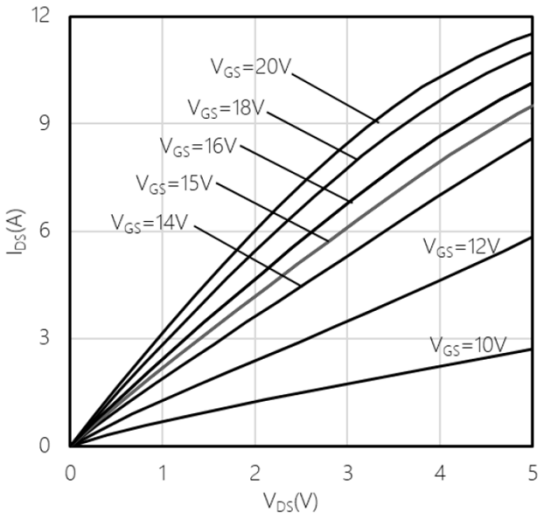


Fig 2. Output Characteristic T_J = 25 ℃

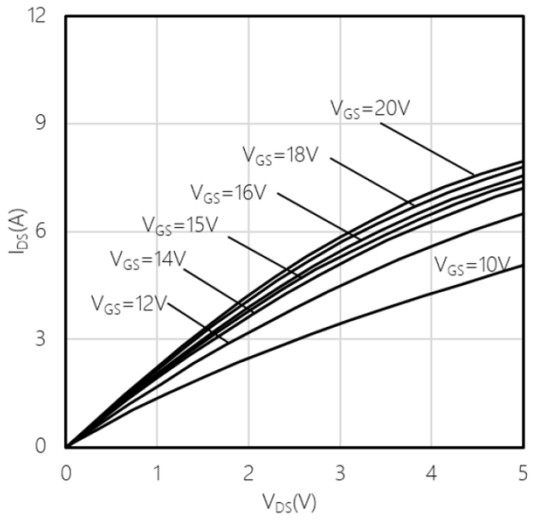


Fig 3. Output Characteristic T_J = 175 ℃

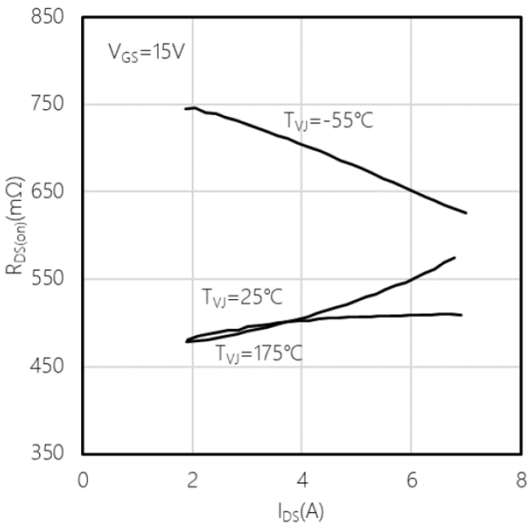


Fig 4. On-Resistance vs. Drain Current
For Various Temperatures , V_{GS} = 15V

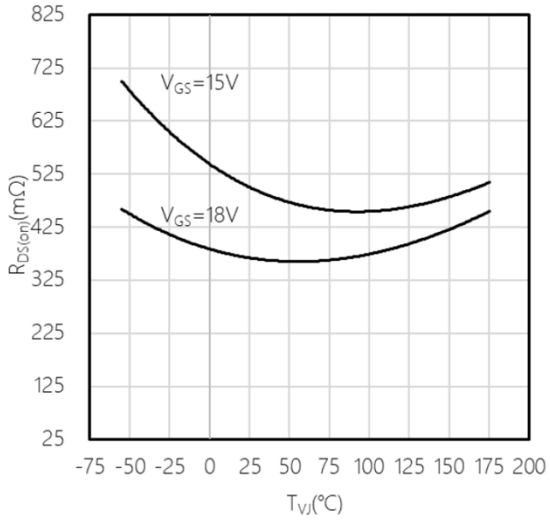


Fig 5. On-Resistance vs. Temperature
For Various Gate Voltage , I_{DS} =4 A

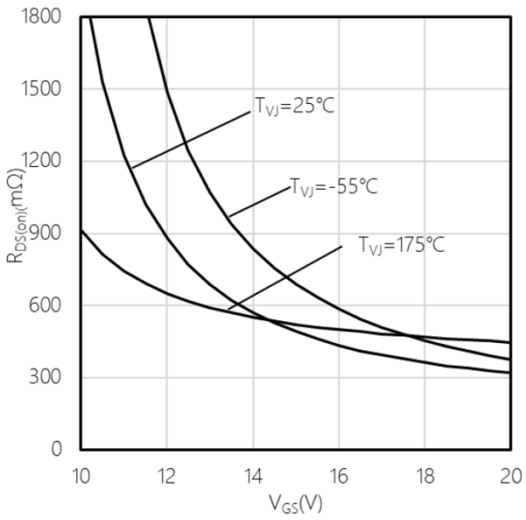


Fig 6. On-Resistance vs. Gate Voltage
For Various Temperatures , I_{DS} =4 A

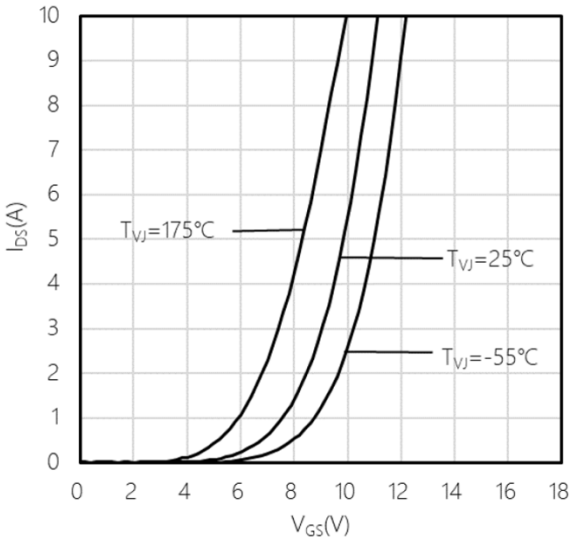


Fig 7. Transfer Characteristic For Various Temperatures V_{DS} = 20V

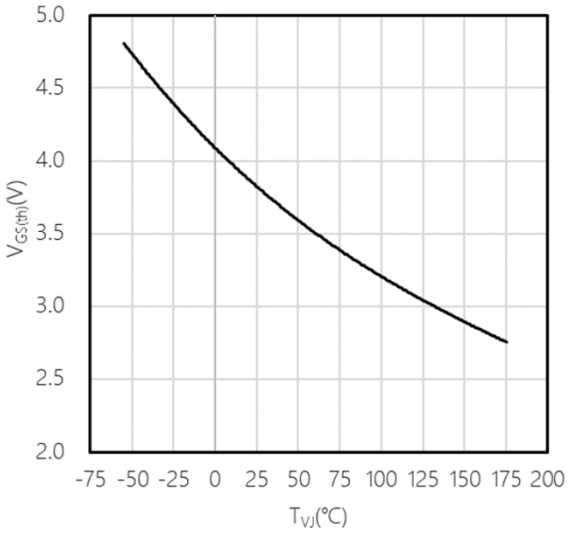


Fig 8. Threshold Voltage vs. Temperature I_{DS} = 3.5 mA

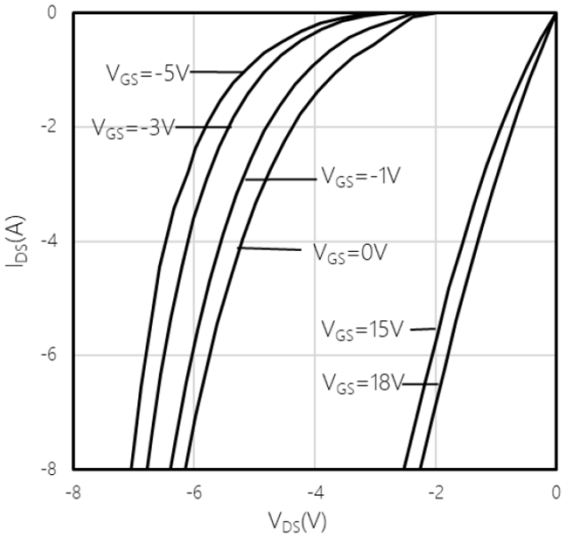


Fig 9. 3rd Quadrant Characteristic T_J = -55 ℃

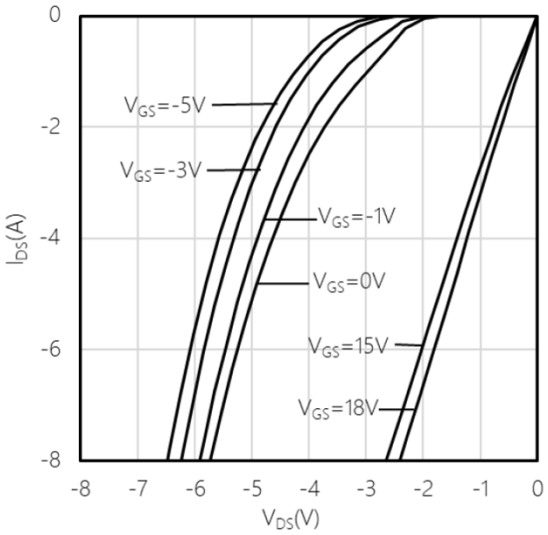


Fig 10. 3rd Quadrant Characteristic T_J = 25 ℃

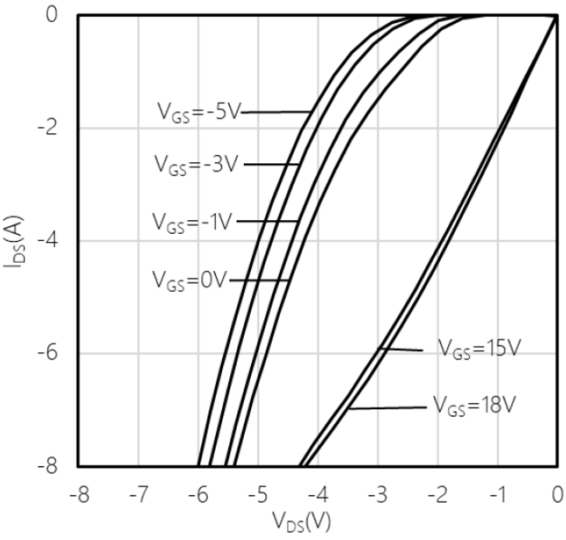


Fig 11. 3rd Quadrant Characteristic T_J = 175 ℃

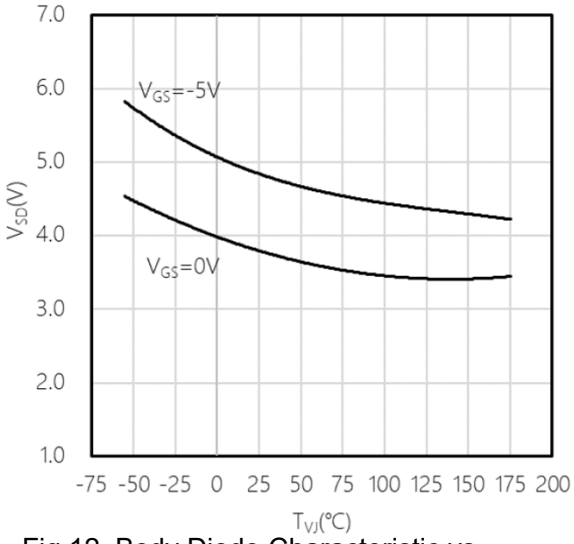


Fig 12. Body Diode Characteristic vs. Temperature For Various Gate Voltage I_{SD} = 2 A

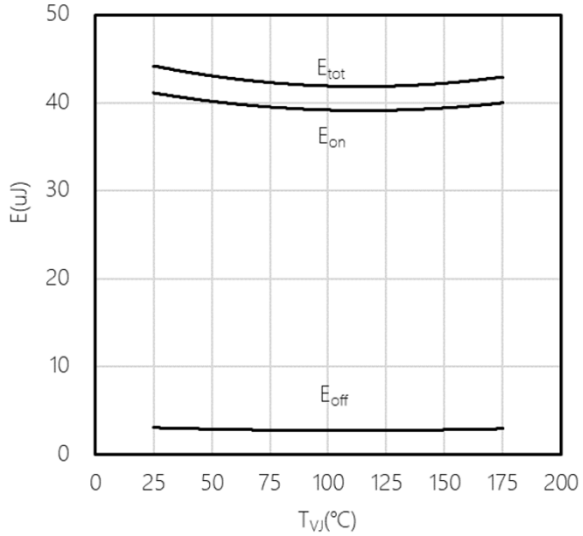


Fig 13. Switching Energy vs.Temperature, 2nd device own body diode: V_{GS} = 0 V, V_{DS} = 400 V, $R_{G(ext)}$ = 10 Ω, V_{GS} = 0V / 15 V, I_{DS} = 4 A

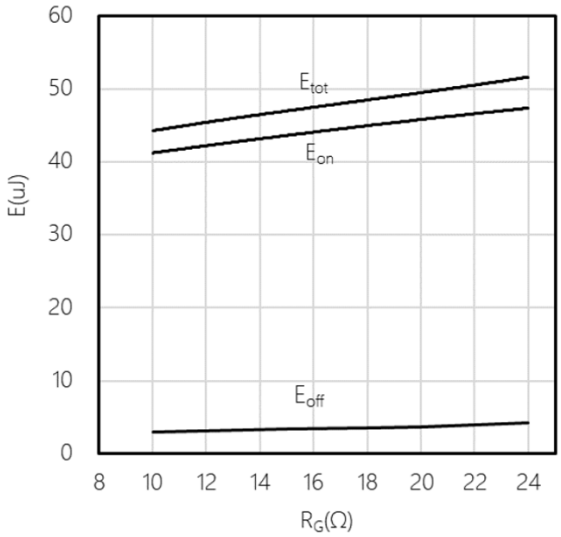


Fig14. Switching Energy vs.Rg, 2nd device own body diode: V_{GS} = 0 V, V_{DS} = 400 V, V_{GS} = 0V / 15 V, I_{DS} = 4 A , T_J = 25 °C

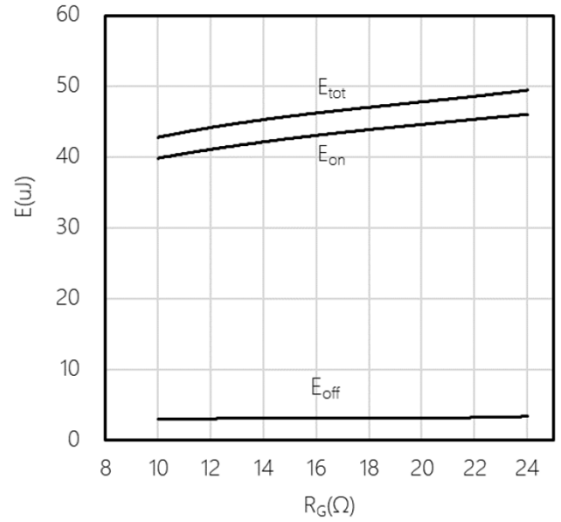


Fig 15. Typical switching energy vs.Rg, 2nd device own body diode: V_{GS} = 0 V, V_{DS} = 400 V, V_{GS} = 0V / 15 V, I_{DS} = 4 A, T_J = 175 °C

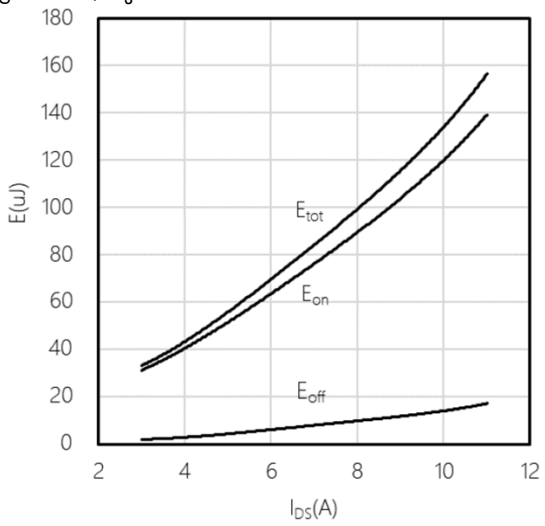


Fig16. Switching energy vs.I_{DS}, 2nd device own body diode: V_{GS} = 0 V, V_{DS} = 400 V, $R_{G(ext)}$ = 10 Ω, V_{GS} = 0V / 15 V, T_J = 25 °C

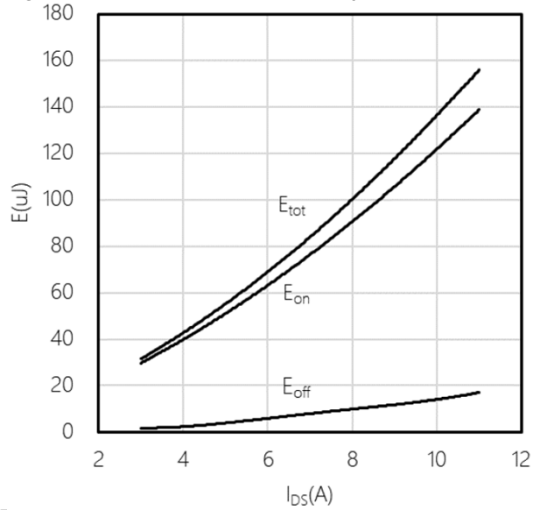


Fig 17. Switching energy vs.I_{DS}, 2nd device own body diode: V_{GS} = 0 V, V_{DS} = 400 V, $R_{G(ext)}$ = 10 Ω, V_{GS} = 0V / 15 V, T_J = 175 °C

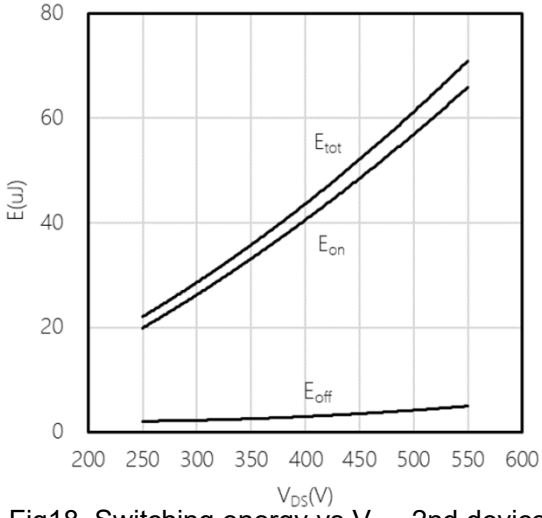


Fig18. Switching energy vs.V_{DS}, 2nd device own body diode: V_{GS} = 0 V, V_{DS} = 400 V, $R_{G(ext)}$ = 10 Ω, V_{GS} = 0V / 15 V, I_{DS} = 4 A, T_J = 25 °C

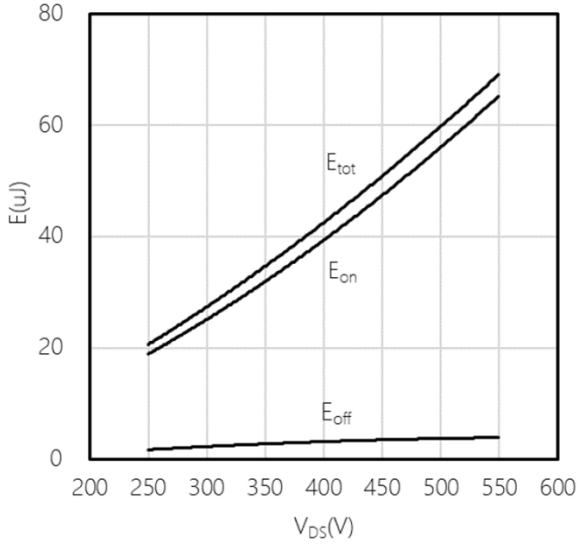


Fig19. Switching energy vs.V_{DS}, 2nd device own body diode: V_{GS} = 0 V, V_{DS} = 400 V, $R_{G(ext)}$ = 10 Ω, V_{GS} = 0V / 15 V, I_{DS} = 4 A, T_J = 175 °C

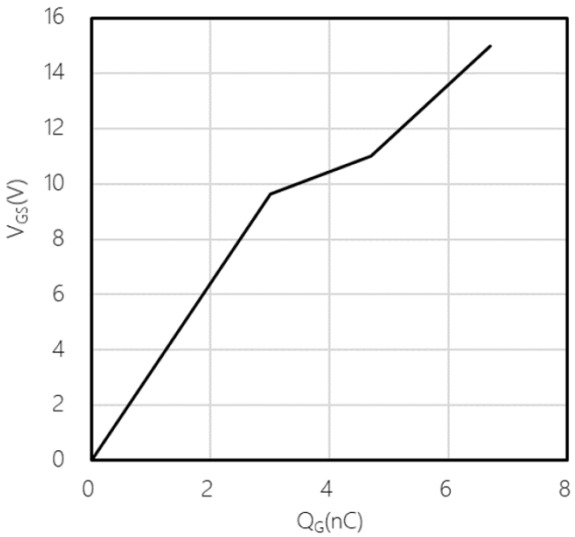


Fig20. Gate Charge Characteristics

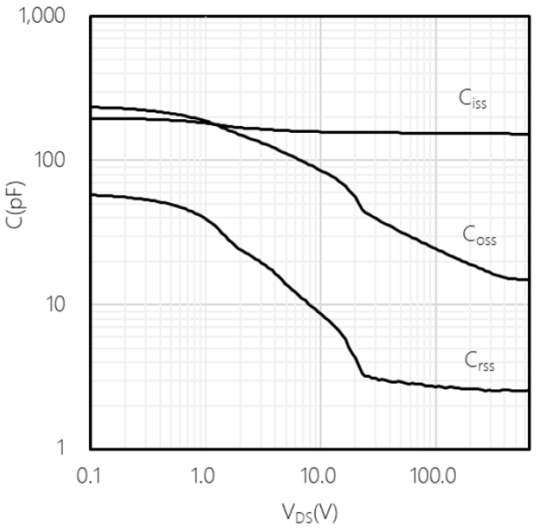


Fig21. Capacitance vs. Drain-Source V_{GS}=0V, f=1MHz

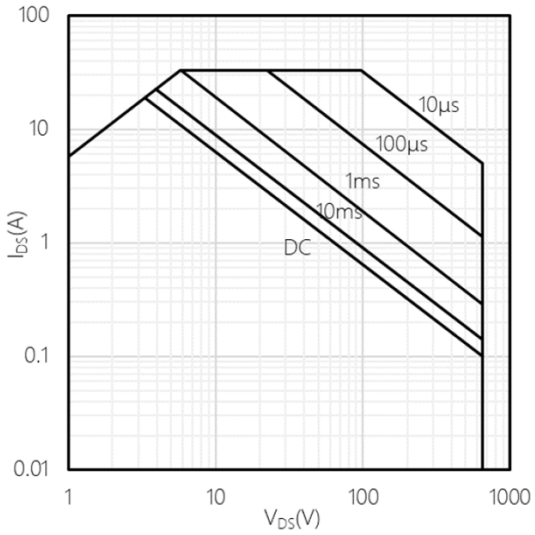


Fig22. Safe operating area (SOA) $R_{th(\ j\text{-}c)}$=4.39 °C/W, Single Pulse, T_J = 25°C

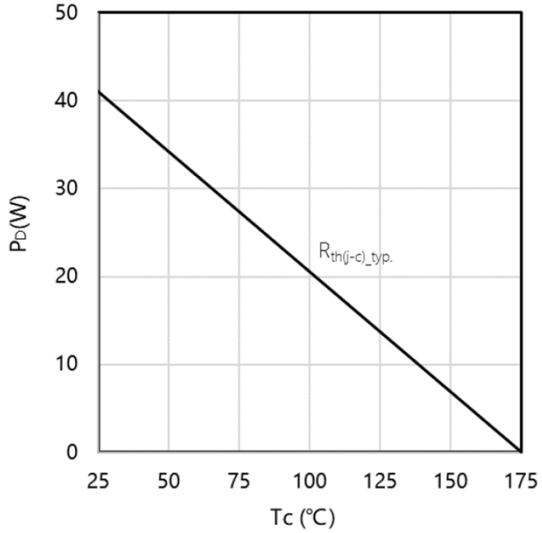


Fig23. Power dissipation as a function of case temperature limited by bond wire

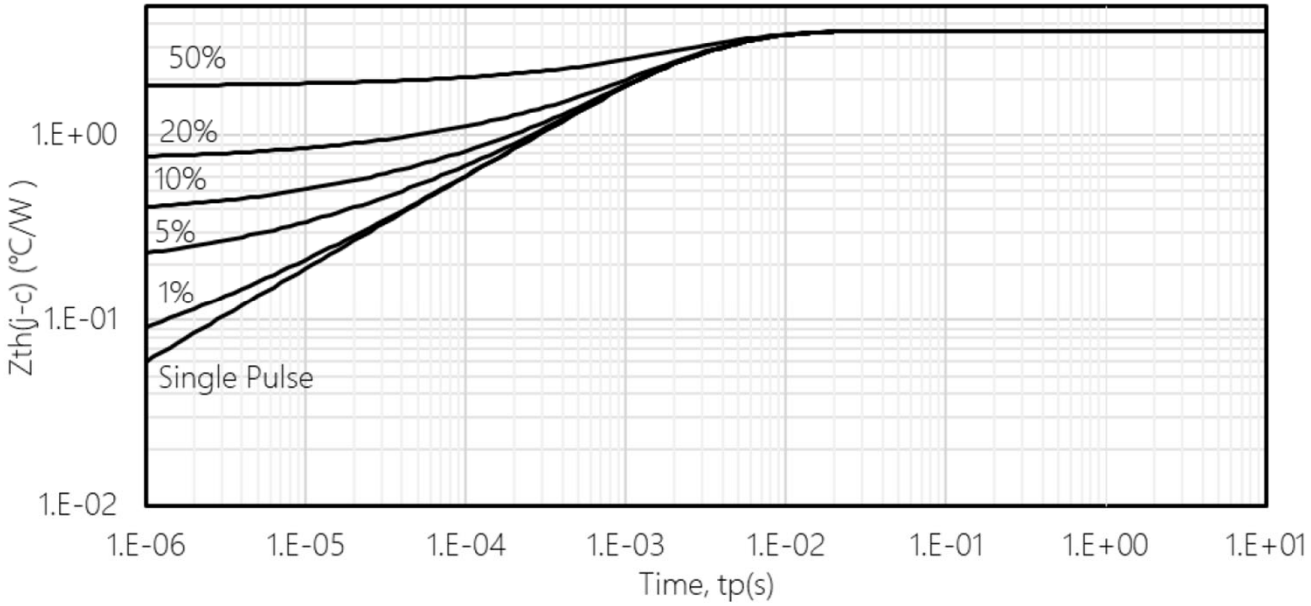
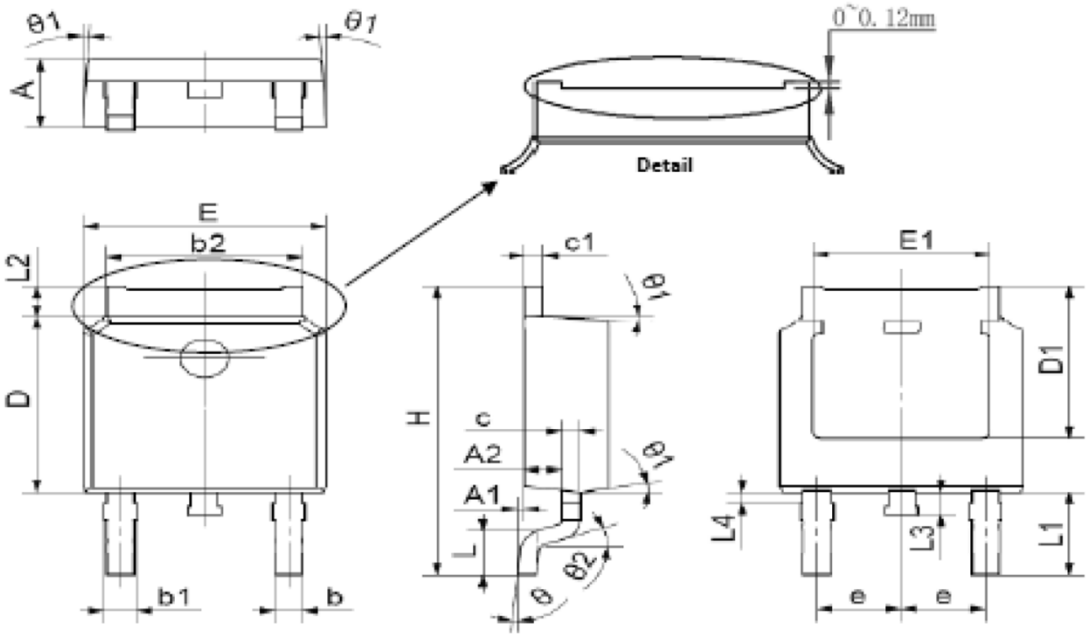


Fig22. Transient Thermal Impedance

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	

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