/ Descriptions

TO-220F SiC N MOS

SiC N-CHANNEL MOSFET in a TO-220F Plastic Package.

/ Features

V_{DS}=650V I_D=8.8A

$R_{DS(on)}$@15V≤568mΩ(Type.437mΩ)

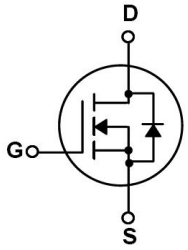
$R_{DS(on)}$@18V≤480mΩ(Type. 316mΩ)

/ Applications

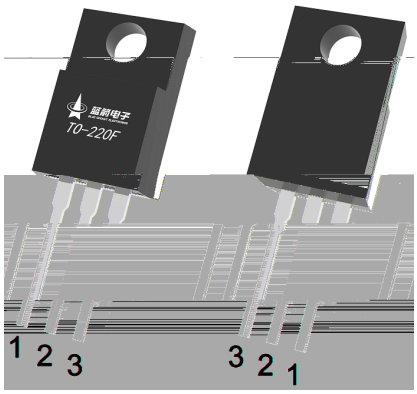
LED PD PC

LED driver, PD charger, PC adapter, Air-conditioning, E-bike charger.

/ Equivalent Circuit



/ Pinning



PIN1 G PIN 2 D PIN 3 S

/ Marking

See Marking Instructions.

/ Absolute Maximum Ratings(Tc=25)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DSS}	650	V
Continuous DC Drain Current for $R_{th(j-c,typ.)}$, Limited by $T_{VJ(max)}$	I_D(Tc=25)	8.8	A
	I_D(Tc=100)	6.8	A
Peak Drain Current, tp Limited by $T_{VJ(max)}$	I_{DM}	14	A
Gate-Source Max Voltage	$V_{GS,max}$	-10/+22	V
Gate-Source Operate Voltage	$V_{GS,op}$	0/+15	V
Single Pulse Avalanche Energy	E_{AS}	13.3	mJ
Power Dissipation or $R_{th(j-c,typ.)}$	P_D(Tc=25)	24	W
Operating and Storage Temperature Range	T_{VJ},T_{STG}	-55 to 175	
MOSFET/Body Diode Junction-Case Thermal Resistance	$R_{th(j-c)}$	6.25	/W

/ Electrical Characteristics(Tc=25)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=100μA	650			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS} I_D=3.5mA	3		5	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=650V V_{GS}=0V		0.1	20	μA
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
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS}=15V I_D=4.5A		437	568	mΩ
		V_{GS}=15V I_D=4.5A T_{VJ}=175		406		
		V_{GS}=18V I_D=4.5A		316	480	
		V_{GS}=18V I_D=4.5A T_{VJ}=175		379		
Body Diode Forward Voltage	V_{SD}	V_{GS}=0V I_S=2.5A		3.8		V
Continuous DC Source Current	I_S			8		A
Peak Reverse Drain Current,	I_{SM}			14		A
Reverse Recovery Time	t_{rr}	V_{GS} = 0V, I_{SD}=4.5A, V_R=400V, di/dt=1.1kA/us		9.4		ns
Reverse Recovery Charge	Q_{rr}			23		nC
Peak Reverse Recovery Current	I_{rrm}			4.1		A
Reverse Recovery Energy	E_{rr}			0.16		μJ

/ Electrical Characteristics(Tc=25)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Turn-On Delay Time	$t_{d(on)}$	V_{GS}=0/15V L=600μH V_{DD}=400V I_D=4.5A R_g=9.1Ω		17.0		ns
Turn-On Rise Time	t_r			12.2		
Turn-Off Delay Time	$t_{d(off)}$			14.5		
Turn-Off Fall Time	t_f			13.1		
Turn−On Switching Loss	E_{on}			45.4		μJ
Turn−Off Switching Loss	E_{off}			3.86		
Total Switching Energy	E_{tot}			49.2		
Gate resistance	R_g	V_{AC}=25mV f=1MHz		25		Ω
Input Capacitance	C_{iss}	V_{DS}=400V V_{GS}=0V f=1MHz		170		pF
Output Capacitance	C_{oss}			13		
Reverse Transfer Capacitance	C_{rss}			1.3		
Total Gate Charge	Q_g	V_{GS}=0/15V, V_{DS}=400V, I_D=4.5A		9.0		nC
Gate Source Charge	Q_{gs}			3.2		
Gate Drain Charge	Q_{gd}			1.3		

/ Electrical Characteristic Curve

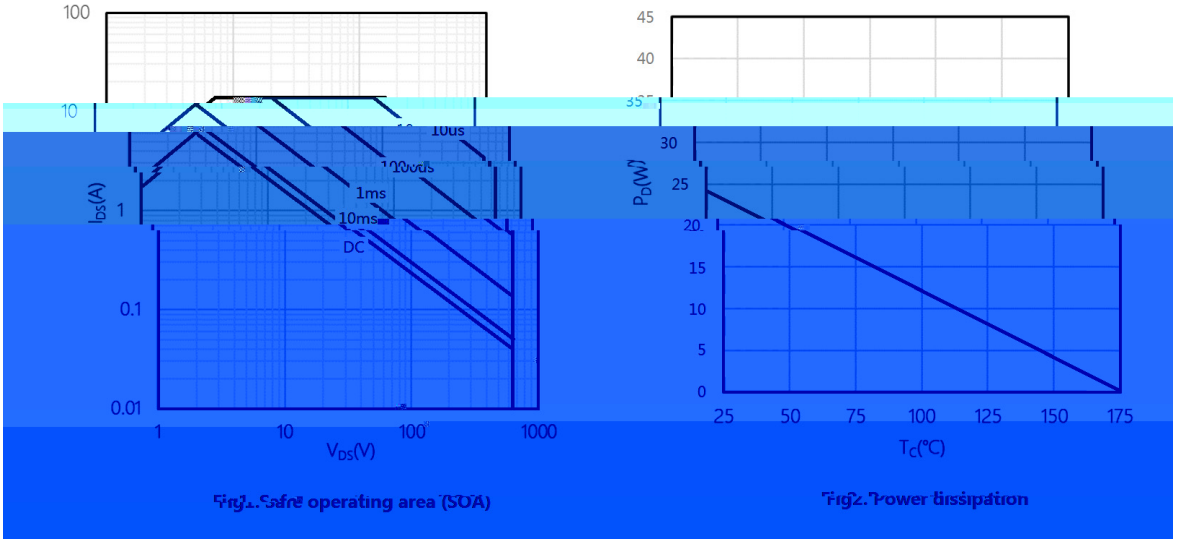


Fig1. Safe operating area (SOA)

Fig2. Power dissipation

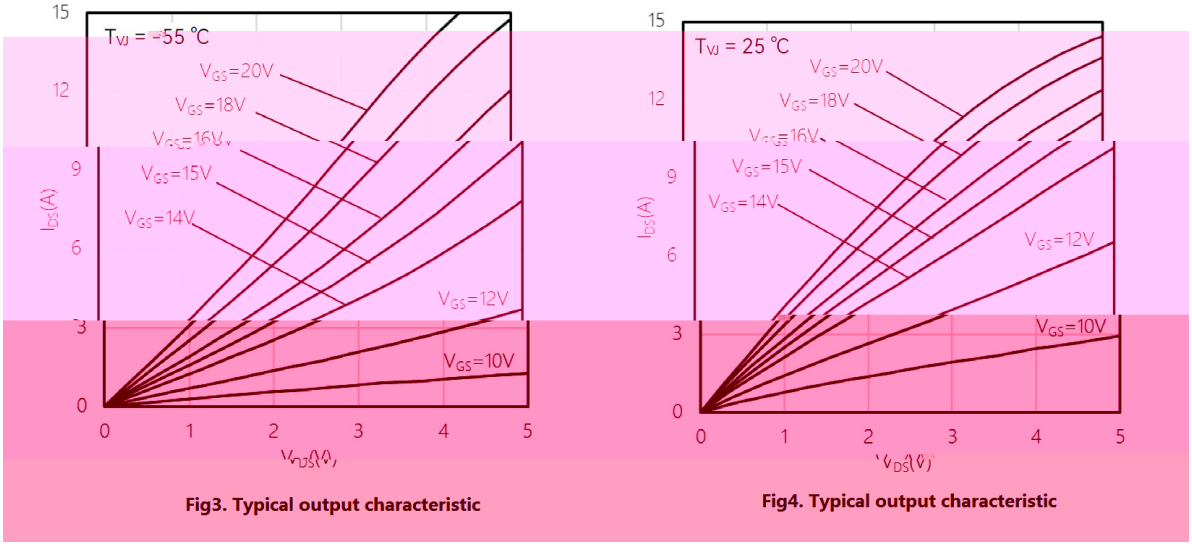


Fig3. Typical output characteristic

Fig4. Typical output characteristic

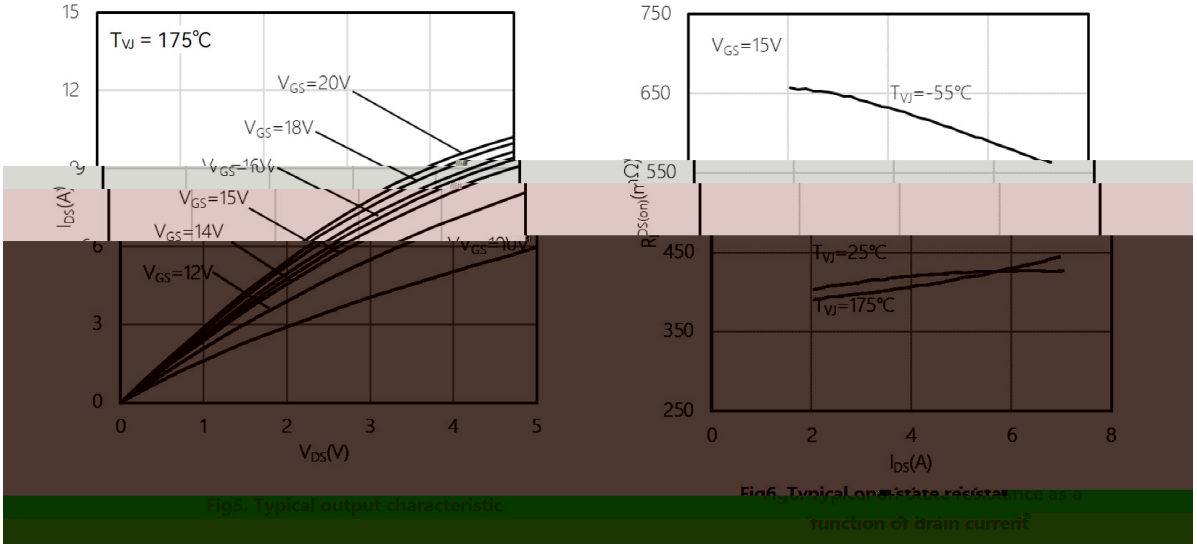


Fig5. Typical output characteristic

Fig6. Typical on-state resistance as a function of drain current

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/ Electrical Characteristic Curve

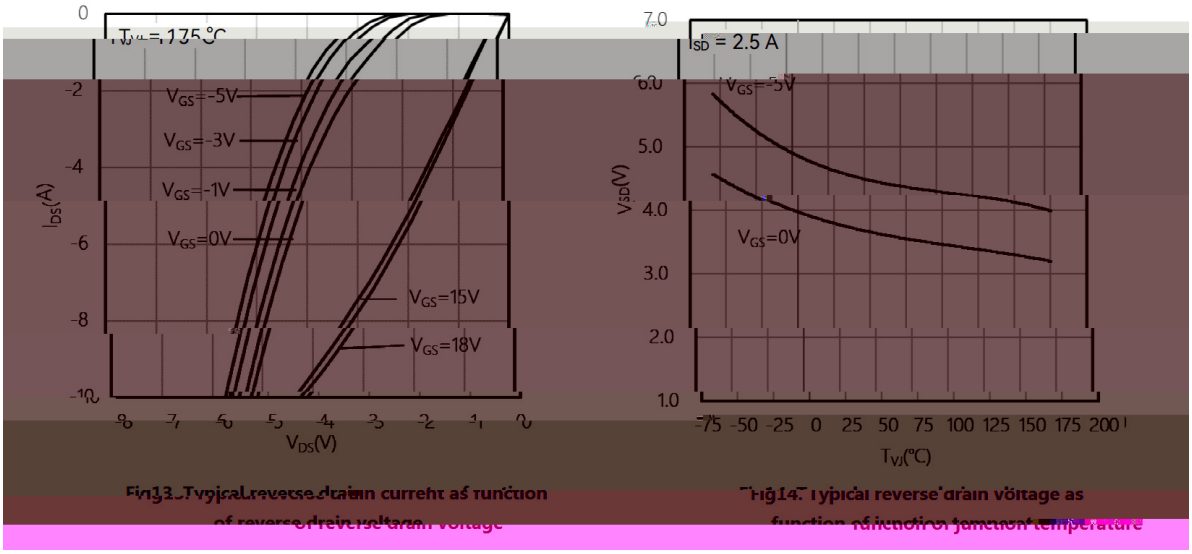


Fig13. Typical reverse drain current as function of reverse drain voltage

Fig14. Typical reverse drain voltage as function of junction temperature

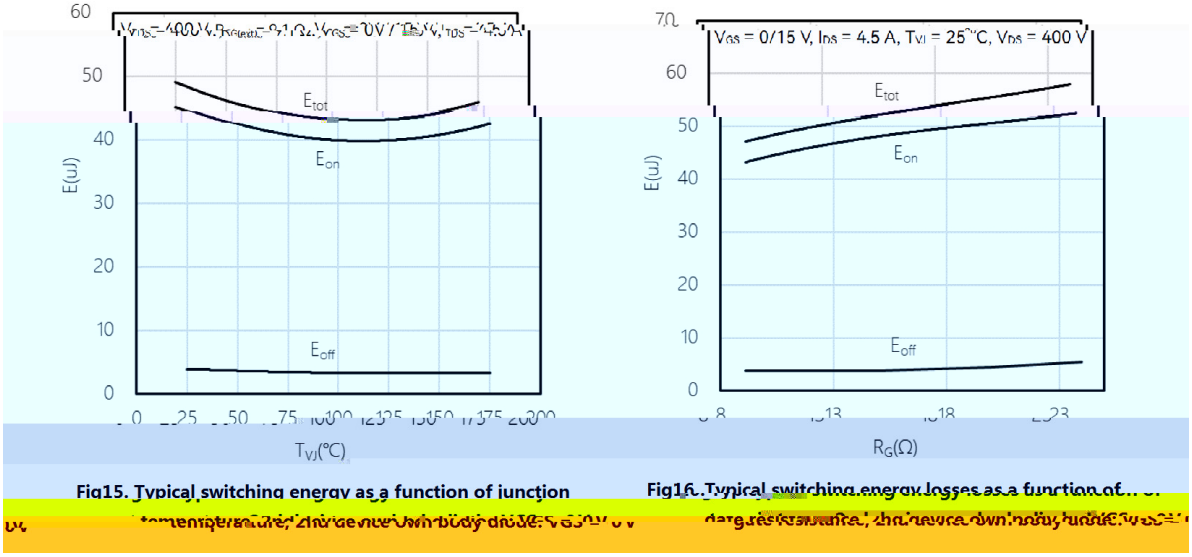


Fig15. Typical switching energy as a function of junction temperature, 2nd device own body diode: VGS = 0V

Fig16. Typical switching energy losses as a function of gate resistance, 2nd device own body diode: VGS = 0V

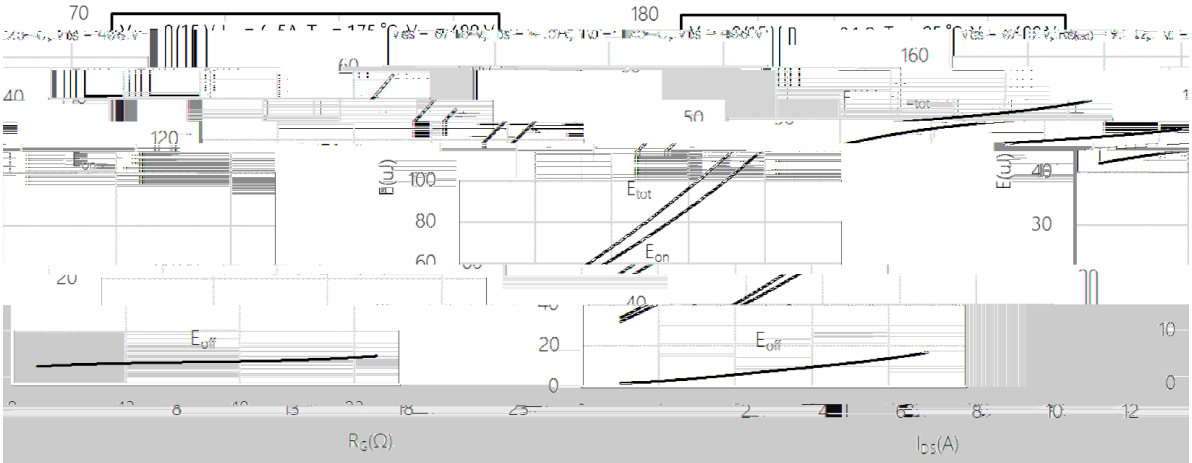
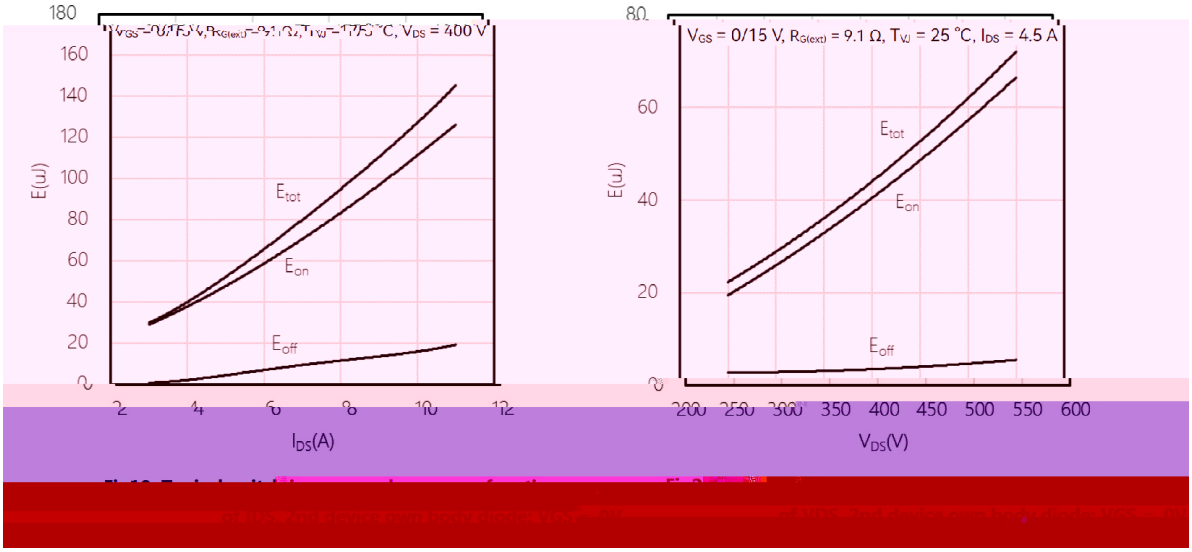


Fig17. Typical switching energy losses as a function of gate resistance, 2nd device own body diode: VGS = 0V

Fig18. Typical switching energy losses as a function of IDS, 2nd device own body diode: VGS = 0V

/ Electrical Characteristic Curve



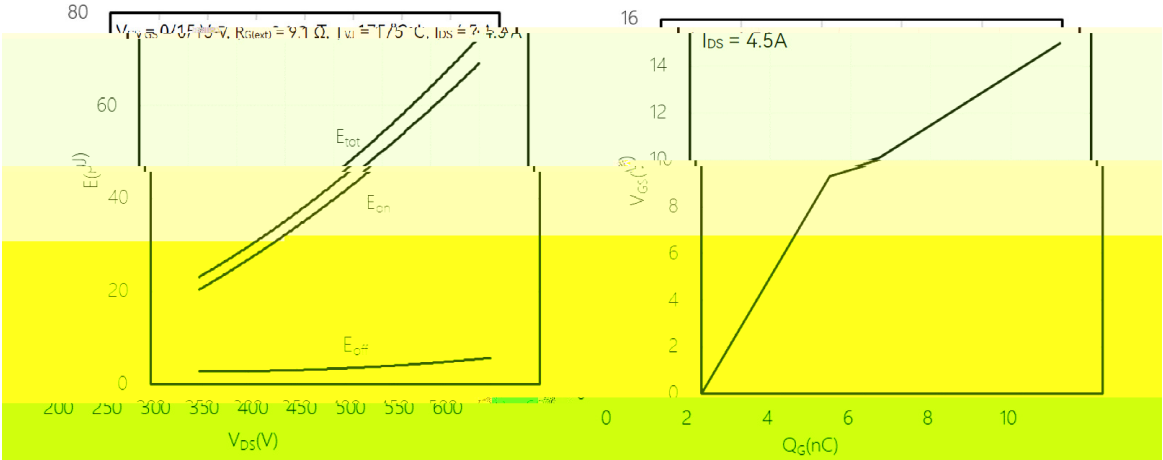


Fig21. Typical switching energy losses as a function of VDS. 2nd device commutated under VGS = 0V

Fig22. Typical gate charge

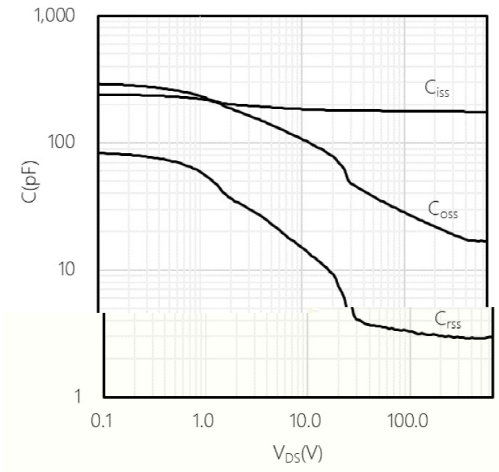


Fig23. Typical capacitance as a function of drain-source voltage

/ Electrical Characteristic Curve

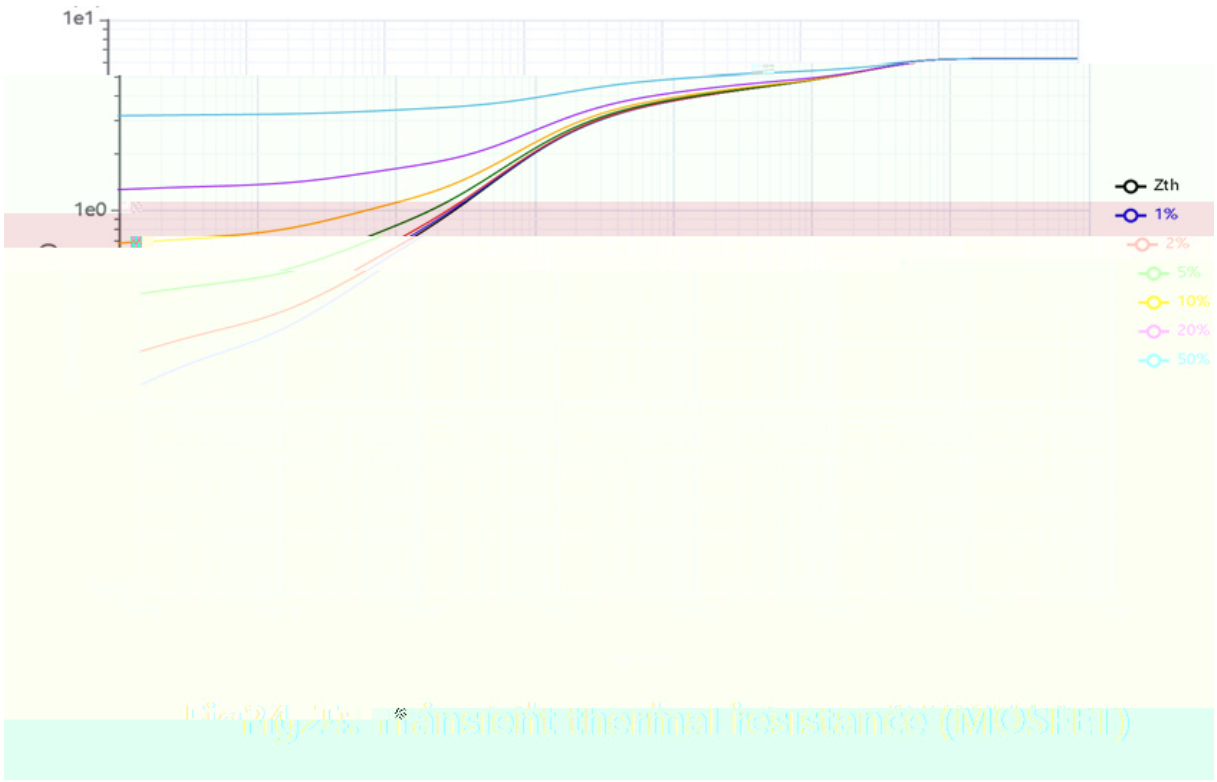
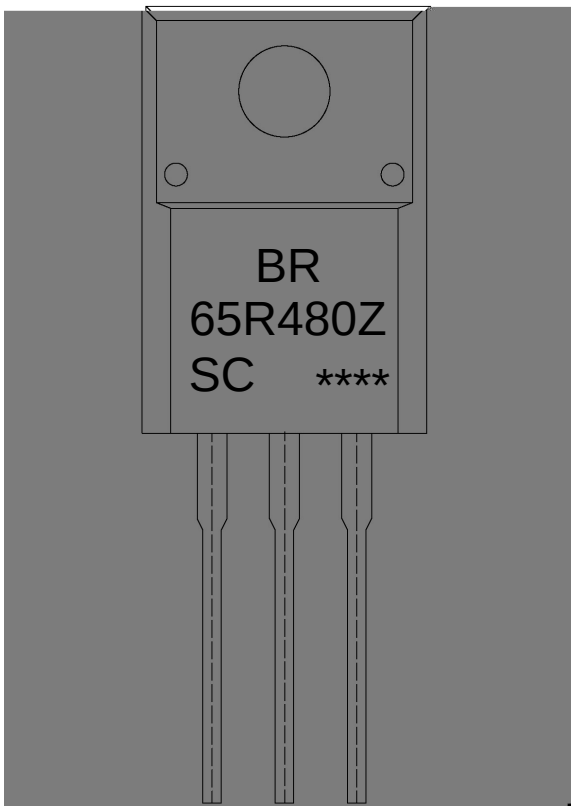


Fig 24. Transient thermal resistance (MOSFET)

/ Marking Instructions



BR

65R480Z

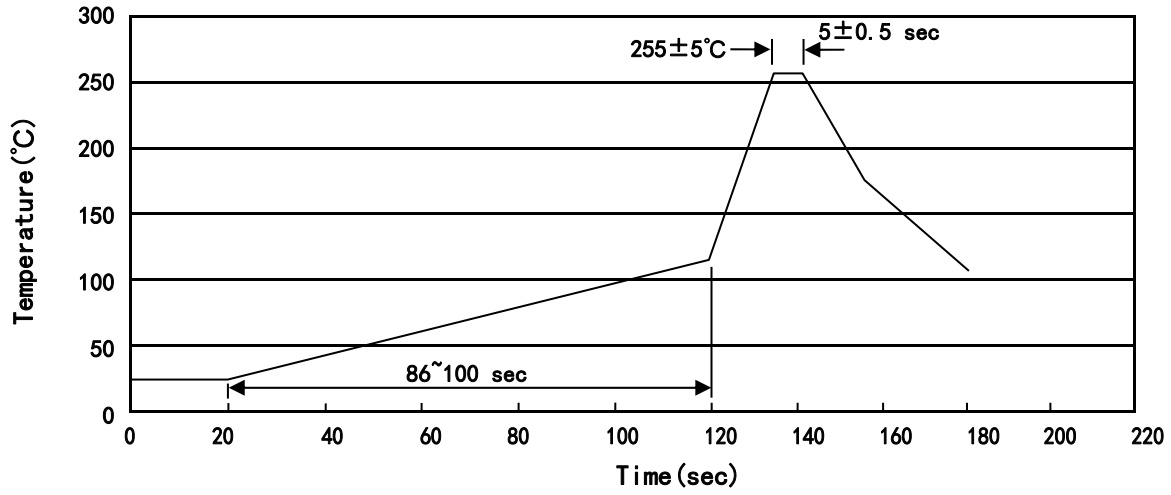
SC

****

Note:

BR:	Company Code
65R480Z:	Product Type Code
SC:	SiC
****:	Lot No. Code, code change with Lot No.

( ) / Temperature Profile for Dip Soldering(Pb-Free)



Note:

1	25	150	60	90sec;	1.Preheating:25~150 , Time:60~90sec.
2	255±5			5±0.5sec;	2.Peak Temp.:255±5 , Duration:5±0.5sec.
3		2	10	/sec.	3. Cooling Speed: 2~10 /sec.

/ In-line Package Resistance to Soldering Heat Test Conditions

270±5	10±1 sec.	Temp.:270±5	Time:10±1 sec

/ Packaging SPEC.

/ BULK

Package Type	Units					Dimension		(unit mm³)
	Units/Bag /	Bags/Inner Box /	Units/Inner Box /	Inner Boxes/Outer Box /	Units/Outer Box /	Bag	Inner Box	Outer Box
TO-220/F	200	10	2,000	5	10,000	135×190	237×172×102	560×245×195

/ TUBE

Package Type	Units					Dimension		(unit mm³)
	Units/Tube /	Tubes/Inner Box /	Units/Inner Box /	Inner Boxes/Outer Box /	Units/Outer Box /	Tube	Inner Box	Outer Box
TO-220/F	50	20	1,000	5	5,000	532×31.4×5.5	555×164×50	575×290×180

/ Notices

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