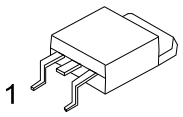
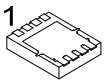
USC065R180B

Power MOSFET

19.5A, 650V N-CHANNEL SILICON CARBIDE PLANAR ENHANCEMENT POWER MOSFET



TO-252



PDFN5×6

■ DESCRIPTION

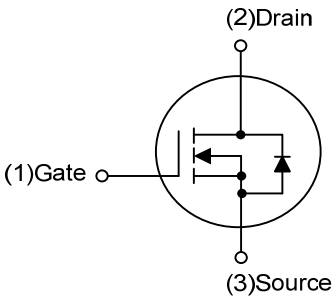
SiC The material can achieve high voltage with most carrier devices (MOSFET) with fast device structure characteristics, so it can realize the three characteristics of "high voltage", "low on resistance" and "high frequency" at the same time.

It is widely used in electric vehicle charger, industrial equipment power supply, efficient power regulator inverter and rectification part and other uses.

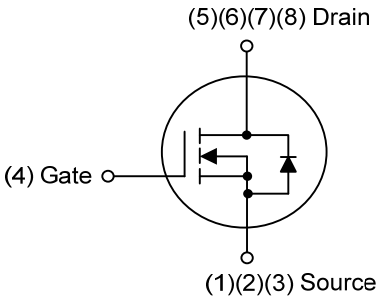
■ FEATURES

* $R_{DS(ON)} \leq 215\ m\Omega$ @ V_{GS}=15V, I_D=7.0A
* Wide bandgap SiC MOSFET technology
* High Blocking Voltage with Low On-Resistance
* High Speed Switching with Low Capacitances
* High-Speed And High Robust Intrinsic Body Diode

■ SYMBOL



TO-252



PDFN5×6

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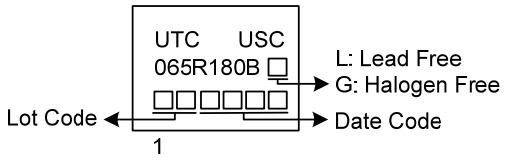
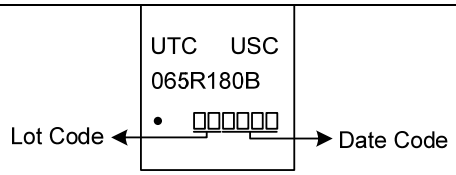
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
USC065R180BL-TN3-R	USC065R180BG-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
USC065R180BL-P5060-R	USC065R180BG-P5060-R	PDFN5×6	S	S	S	G	D	D	D	D	Tape Reel

Note: Pin Assignment: G: Gate D: Drain S: Source

USC065R180BG-TN3-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) TN3: TO-252, P5060: PDFN5×6 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

TO-252	PDFN5×6
	

■ ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise specified)

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V_{DSS}	650	V
Gate-Source Voltage	Dynamic		V_{GSS}	-10 / +22	V
	Static			0 / +15	V
Drain Current	Continuous	T_C=25°C	I_D	19.5	A
		T_C=100°C		13.5	A
	Pulsed (Note 2)		I_{DM}	34	A
Power Dissipation		TO-252	P_D	76	W
		PDFN5×6		134	W
Junction Temperature			T_J	-55 ~ +175	°C
Storage Temperature			T_{STG}	-55 ~ +175	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. Repetitive Rating: Pulse width limited by maximum junction temperature.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Case	TO-252	θ_{JC}	1.98	°C/W
	PDFN5×6		1.12	°C/W

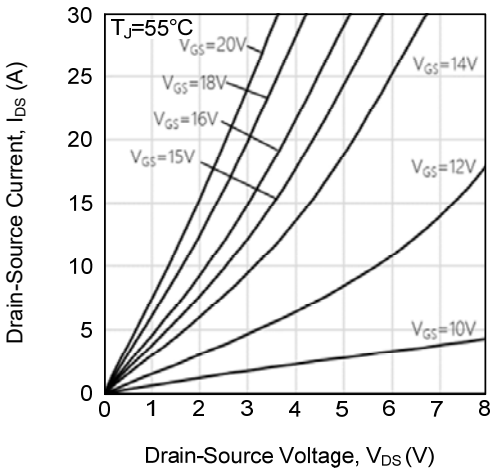
Notes: 1. The maximum current rating is package limited.
2. Pulse Test Pulse Width ≤ 10ms, Duty Cycle ≤ 1%.

■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

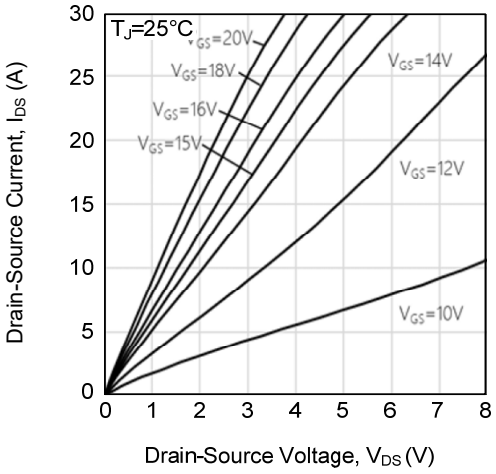
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=100μA, V_{GS}=0V	650			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=650V, V_{GS}=0V		0.1	20	μA
Gate- Source Leakage Current	I_{GSS}	V_{GS}=-10/+22V, V_{DS}=0V			±250	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=10mA	3.2	3.9	5.0	V
		V_{DS}=V_{GS}, I_D=10mA, T_J=175°C		2.8		V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=15V, I_D=7.0A		180	215	mΩ
		V_{GS}=15V, I_D=7.0A, T_J=175°C		164		mΩ
Transconductance	g_{FS}	V_{DS}=20V, I_D=7.0A		4.3		S
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{DS}=650V, V_{GS}=0V, f=1MHz		418		pF
Output Capacitance	C_{OSS}			33		pF
Reverse Transfer Capacitance	C_{RSS}			4.3		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	V_{DS}=400V, V_{GS}=0V / +15V, I_D=7.0A		15.3		nC
Gate to Source Charge	Q_{GS}			5.5		nC
Gate to Drain Charge	Q_{GD}			2.6		nC
Internal Gate Input Resistance	R_G	V_{AC}=25mV, f=1MHz		31		Ω
Turn-on switching energy	E_{ON}	V_{DS}=400V, V_{GS}=0V / +15V, I_D=7.0A, R_G=2.2Ω, L=600μH		67.8		μJ
Turn-off switching energy	E_{OFF}			15		μJ
Turn-ON Delay Time	$t_{D(ON)}$			29.2		ns
Rise Time	t_R			11.7		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			46.1		ns
Fall-Time	t_F			16.5		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_{SD}=3.5A, T_J=25°C		3.3		V
		V_{GS}=0V, I_{SD}=3.5A, T_J=175°C		2.8		V
Continuous Diode Forward Current	I_S				13.5	A
Body Diode Reverse Recovery Time	t_{rr}	V_{GS}=0V, I_F=7.0V, V_R=400V, d_{IF}/dt=2000A/μs		26		ns
Body Diode Reverse Recovery Charge	Q_{rr}			68		nC
Peak Reverse Recovery Current	I_{rrm}			6.9		A

■ TYPICAL CHARACTERISTICS

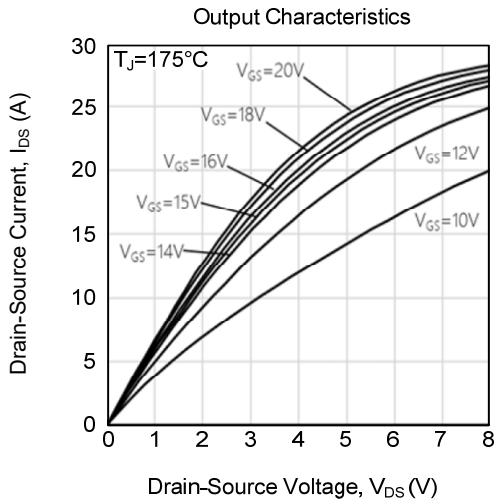
Output Characteristics



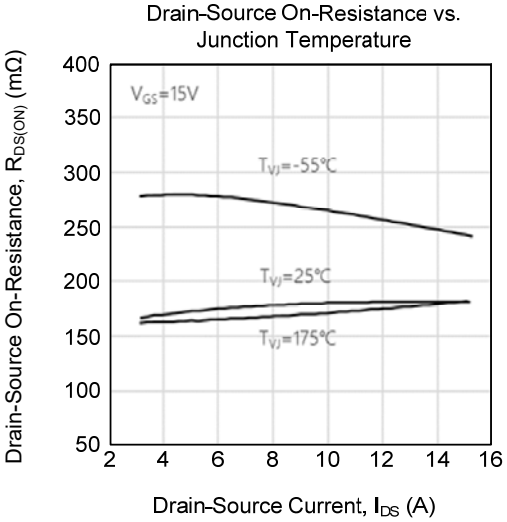
Output Characteristics



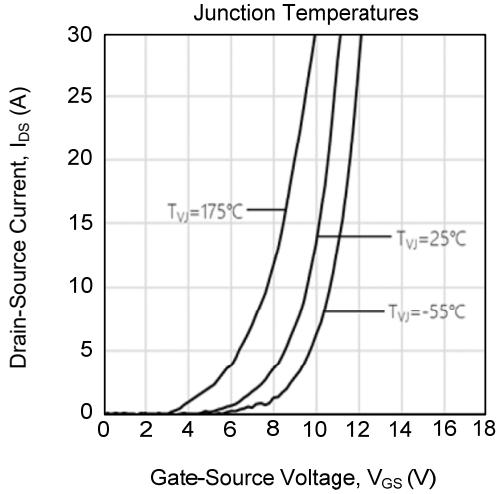
Output Characteristics



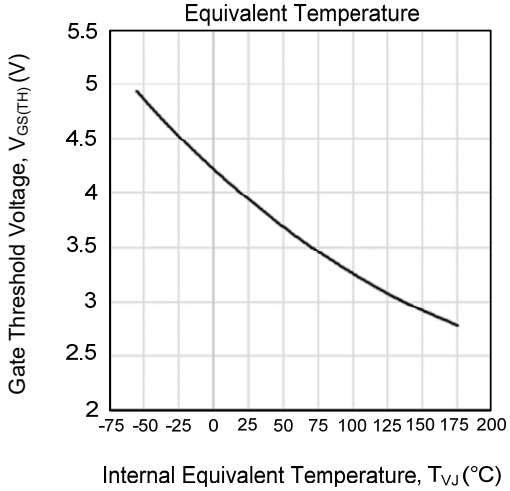
Drain-Source On-Resistance vs. Junction Temperature



Transfer Characteristic For Various Junction Temperatures

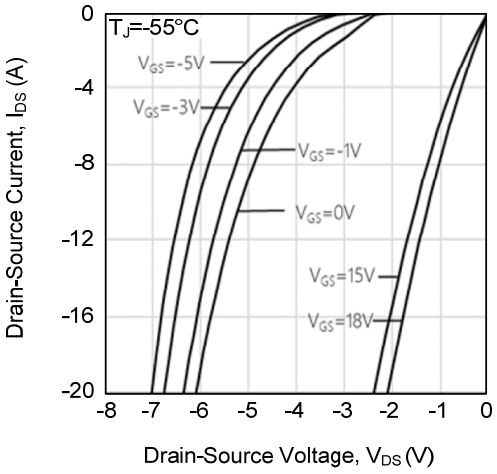


Gate Threshold Voltage vs. Internal Equivalent Temperature

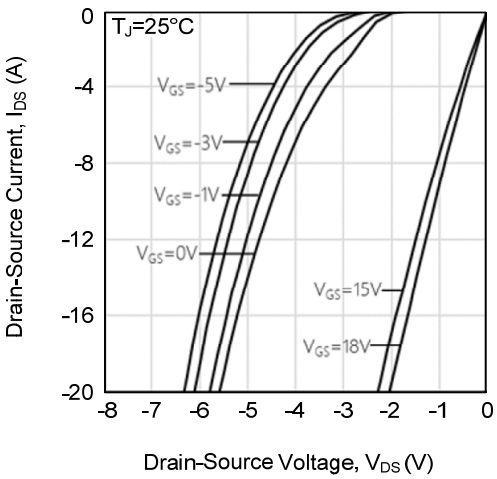


■ TYPICAL CHARACTERISTICS (Cont.)

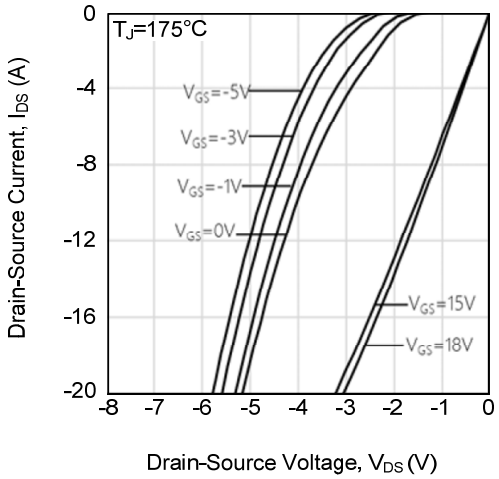
Body Diode Characteristics



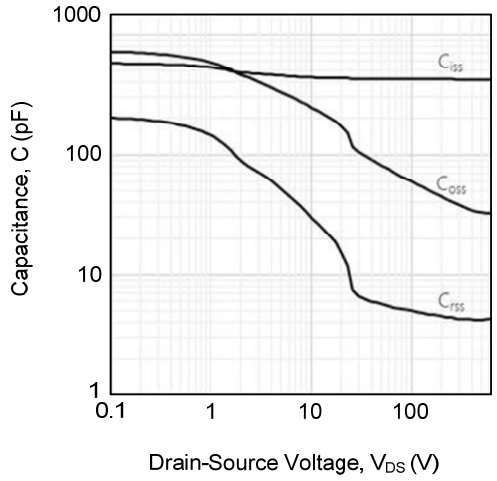
Body Diode Characteristics



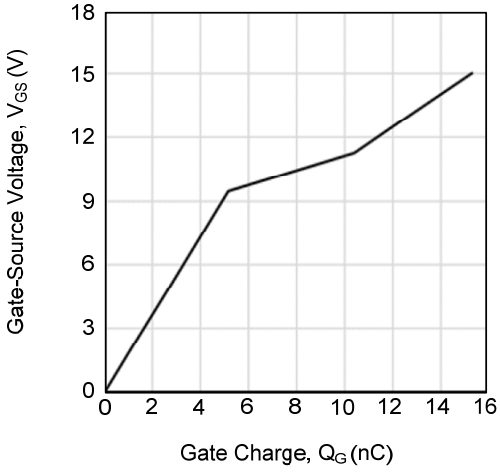
Body Diode Characteristics



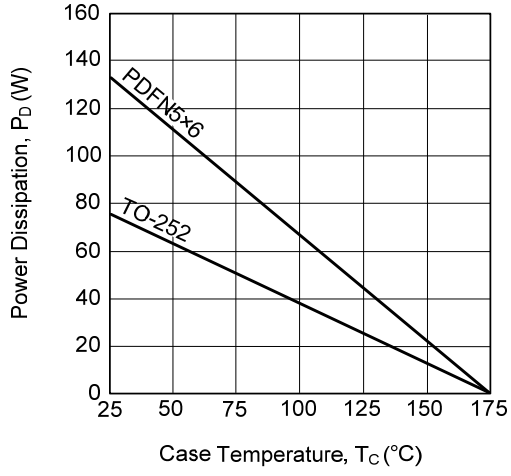
Capacitances Characteristics



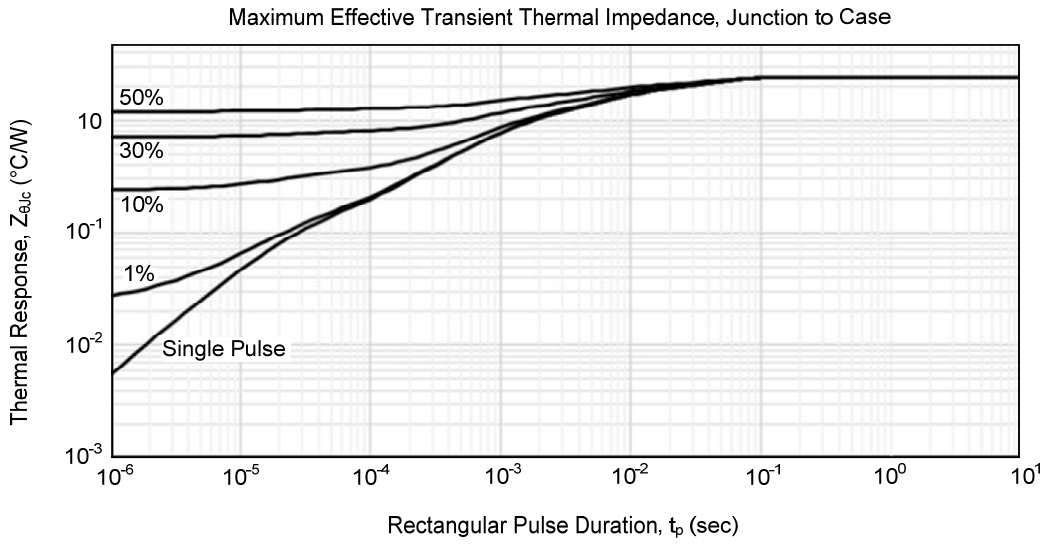
Gate Charge Characteristics



Power Dissipation



■ TYPICAL CHARACTERISTICS (Cont.)



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