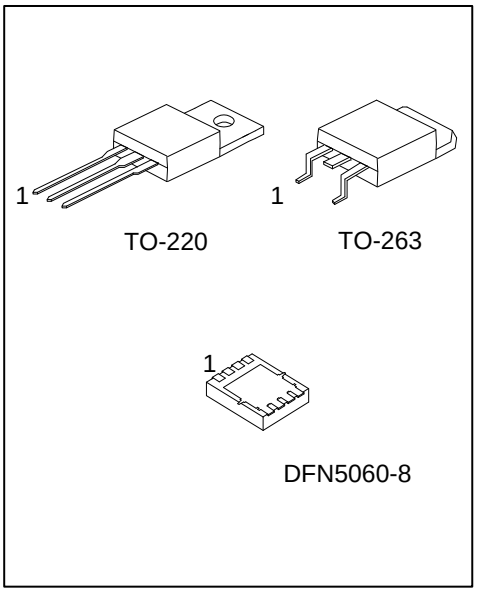
UK4145

Power MOSFET

SWITCHING N-CHANNEL POWER MOSFET



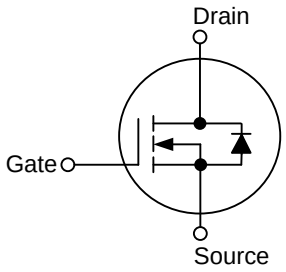
■ DESCRIPTION

The UTC **UK4145** is N-channel power MOSFET, suitable for high current switching applications.

■ FEATURES

* Low on-state resistance:
$R_{DS(ON)} \leq 10\ m\Omega$ @ V_{GS}=10V, I_D=42A

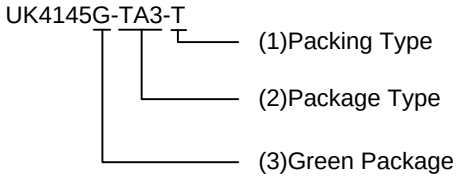
■ SYMBOL



■ ORDERING INFORMATION

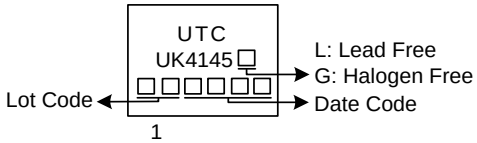
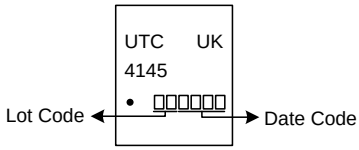
Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UK4145L-TA3-T	UK4145G-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
UK4145L-TQ2-T	UK4145G-TQ2-T	TO-263	G	D	S	-	-	-	-	-	Tube
UK4145L-TQ2-R	UK4145G-TQ2-R	TO-263	G	D	S	-	-	-	-	-	Tape Reel
UK4145L-K08-5060-R	UK4145G-K08-5060-R	DFN5060-8	S	S	S	G	D	D	D	D	Tape Reel

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



(1) T: Tube, R: Tape Reel
(2) TA3: TO-220, TQ2: TO-263
K08-5060: DFN5060-8
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

TO-220 / TO-263	DFN5060-8
	

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage (V_{GS}=0 V)		V_{DSS}	60	V
Gate-Source Voltage (V_{DS}=0 V)		V_{GSS}	±20	V
Drain Current	DC (T_C=25°C)	I_D	84	A
	Pulse (Note 2)	I_{DM}	215	A
Single Avalanche Current (Note 4)		I_{AS}	63.6	A
Single Avalanche Energy (Note 4)		E_{AS}	202	mJ
Power Dissipation (T_A=25°C)	TO-220/TO-263	P_D	2	W
	DFN5060-8		1.5	W
Junction Temperature		T_J	+150	°C
Strong Temperature		T_{STG}	-55 ~ +150	°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.
3. L=100μH, I_{AS}=6.5A, V_{DD}=30V, R_G=25 Ω, V_{GS} =20V, Starting T_J = 25°C
4. P_W≤10μs, Duty Cycle≤1%.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-263	$θ_{JA}$	62.5	°C/W
	DFN5060-8		83.3 (Note)	°C/W
Junction to Case	TO-220/TO-263	$θ_{JC}$	1.25	°C/W
	DFN5060-8		5.43 (Note)	°C/W

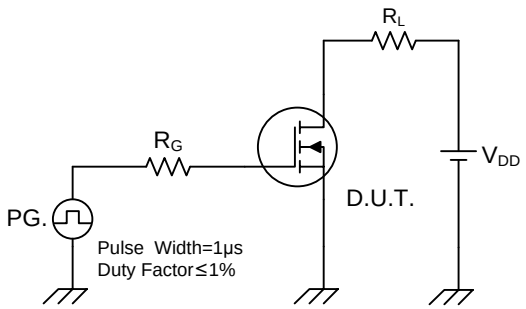
Note: Device mounted on FR-4 substrate P_C board, 2oz copper, with 1inch square copper plate.

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

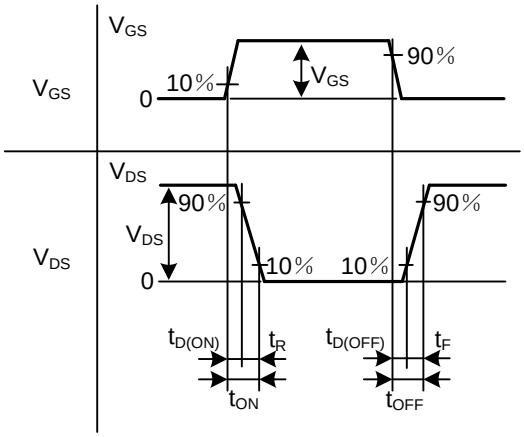
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0V, I_D = 250μA	60			
Drain-Source Leakage Current	I_{DSS}	V_{DS} =60V,V_{GS} =0V			1	μA
Gate-Source Leakage Current	I_{GSS}	V_{DS} =0V, V_{GS} =±20V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(OFF)}$	V_{DS} =10V, I_D =1mA	2.0	3.0	4.0	V
Drain to Source On-state Resistance	$R_{DS(ON)}$	V_{GS} =10 V, I_D =42A		7	10	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{DS} =10V, V_{GS} =0V, f=1MHz		3900		pF
Output Capacitance	C_{OSS}			625		Pf
Reverse Transfer Capacitance	C_{RSS}			475		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	V_{DS}=48V, V_{GS}=10V, I_D=42A, I_G=1mA (Note1,2)		82		nC
Gate Source Charge	Q_{GS}			12		nC
Gate Drain Charge	Q_{GD}			21		nC
Turn-ON Delay Time	$t_{D(ON)}$	V_{DD}=30V, V_{GS}=10V, I_D=42A, R_G =25Ω (Note 1, 2)		15		ns
Turn-ON Rise Time	t_R			20		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			54		ns
Turn-OFF Fall-Time	t_F			27		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				84	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				215	A
Drain-Source Diode Forward Voltage (Note)	V_{SD}	V_{GS} =0V, I_S =84A		1.0	1.5	V
Reverse Recovery Time	t_{rr}	V_{GS} =0V, I_S =84A, di/dt =100A/μs		43		ns
Reverse Recovery Charge	Q_{rr}			50		nC

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

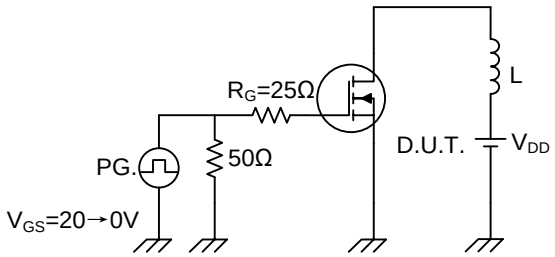
■ TEST CIRCUITS AND WAVEFORMS



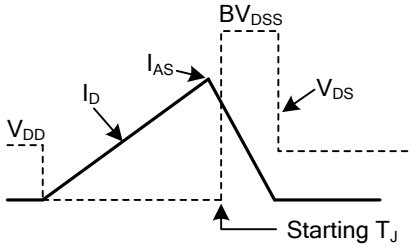
Switching Test Circuit



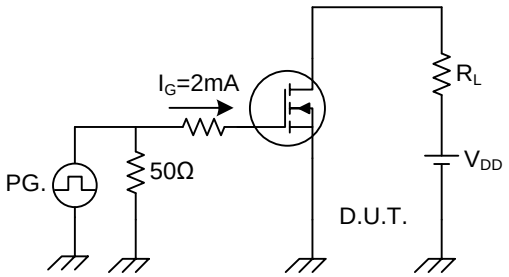
Switching Waveforms



Unclamped Inductive Switching Test Circuit



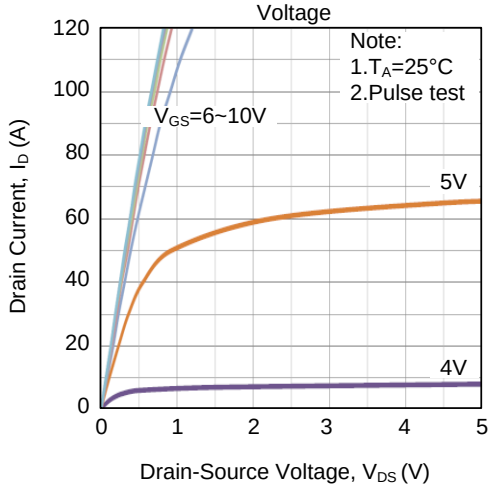
Unclamped Inductive Switching Waveforms



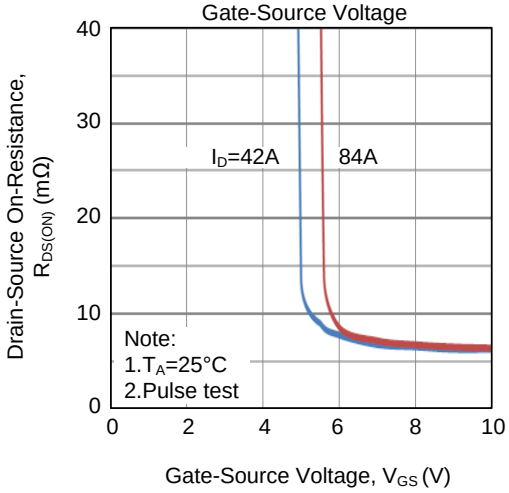
Gate Charge Test Circuit

■ TYPICAL CHARACTERISTICS

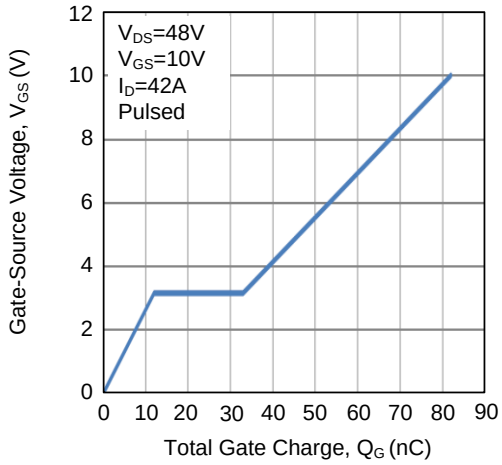
Drain Current vs. Drain-Source Voltage



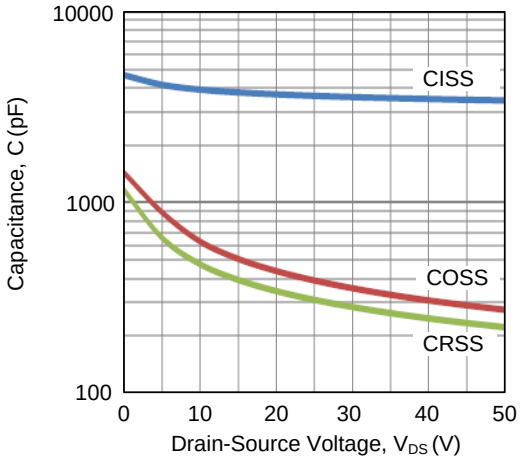
Drain-Source On-Resistance vs. Gate-Source Voltage



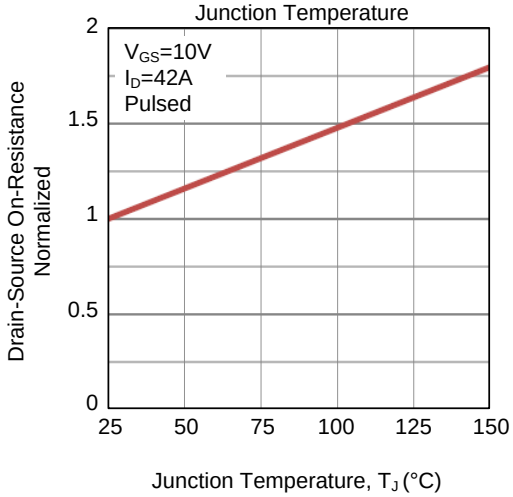
Gate Charge Characteristics



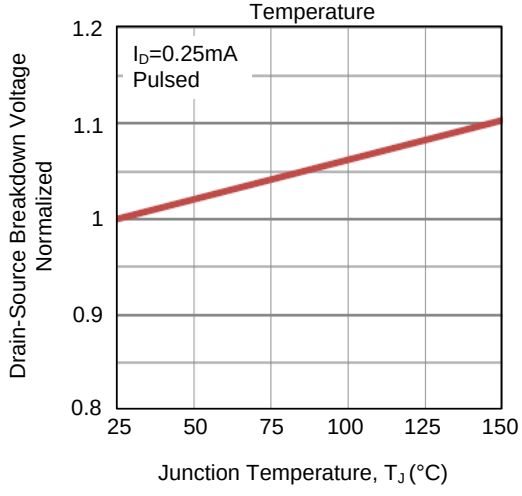
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

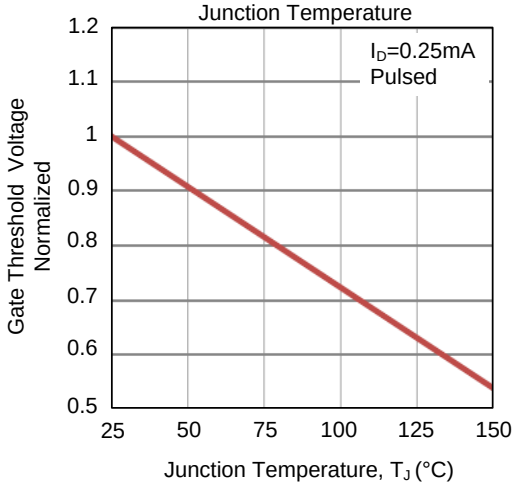


Breakdown Voltage vs. Junction Temperature

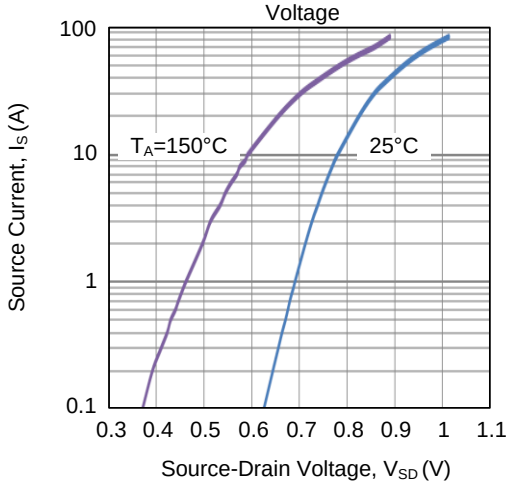


■ TYPICAL CHARACTERISTICS (Cont.)

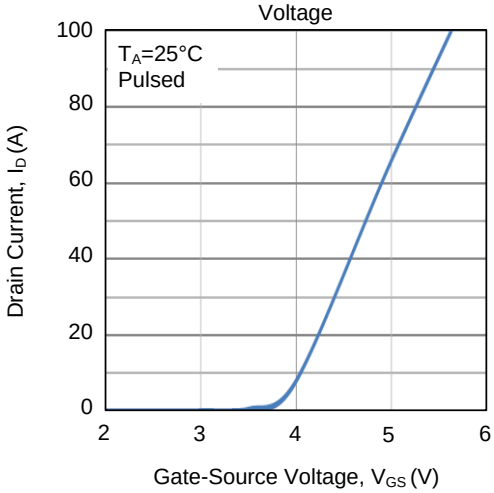
Gate Threshold Voltage vs. Junction Temperature



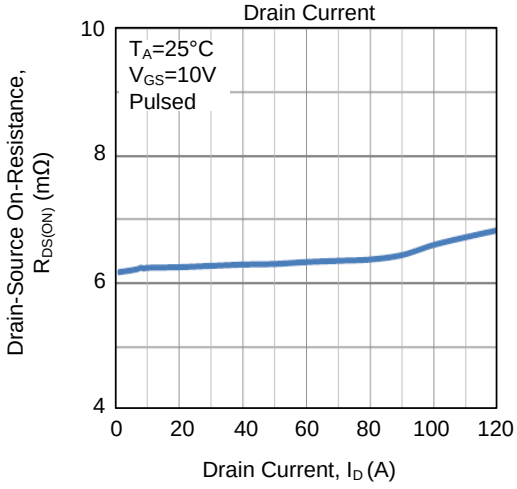
Source Current vs. Source-Drain Voltage



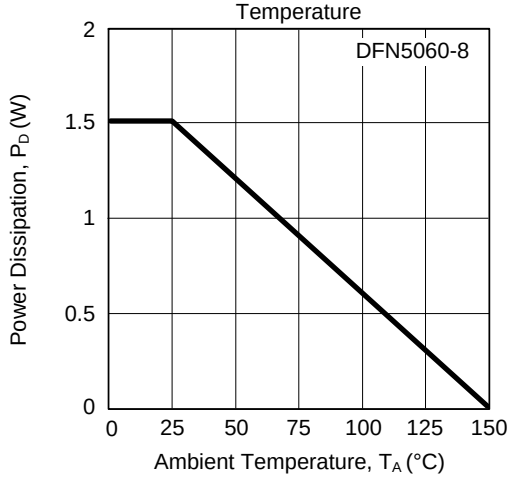
Drain Current vs. Gate-Source Voltage



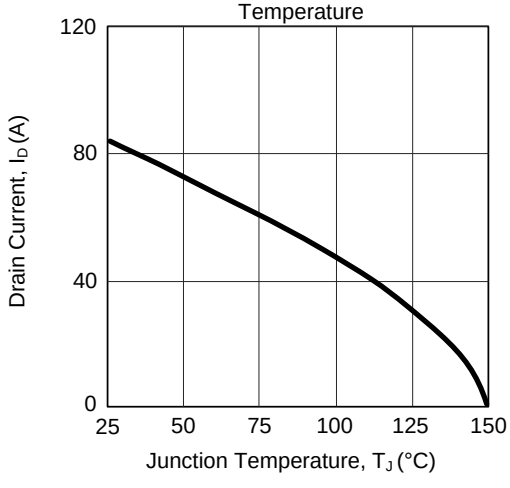
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Ambient Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)