

Pb Free Plating Product

55NF06



N-CHANNEL POWER MOSFET TRANSISTOR

50 AMPERE 60 VOLT N-CHANNEL POWER MOSFET

DESCRIPTION

ThinkiSemi50N06 is three-terminal silicon device with current conduction capability of about 50A, fast switching speed. Low on-state resistance, breakdown voltage rating of 60V, and max threshold voltages of 4 volt.

It is mainly suitable electronic ballast, and low power switching mode power appliances.

FEATURES

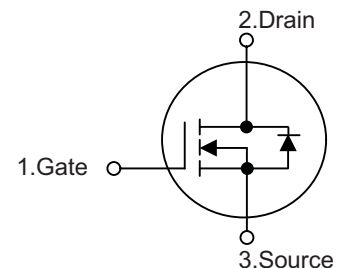
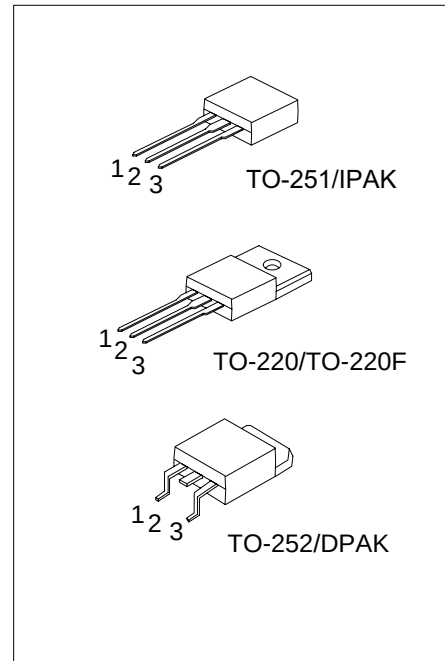
- * $R_{DS(ON)} = 23m\Omega @ V_{GS} = 10V$
- * Ultra low gate charge (typical 30 nC)
- * Low reverse transfer capacitance ($C_{RSS} =$ typical 80 pF)
- * Fast switching capability
- * 100% avalanche energy specified
- * Improved dv/dt capability

SYMBOL

U55NF06 TO-251/IPAK
P55NF06 TO-220
F55NF06 TO-220F
D55NF06 TO-252/DPAK

APPLICATION

Autotmobile Convert System
Networking DC-DC Power System
Power Supply etc..



ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	60	V
Gate-Source Voltage		V_{GSS}	± 20	V
Continuous Drain Current	$T_C = 25^\circ C$	I_D	50	A
	$T_C = 100^\circ C$		35	A
Pulsed Drain Current (Note 2)		I_{DM}	200	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	480	mJ
	Repetitive (Note 2)	E_{AR}	13	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	7	V/ns
Power Dissipation ($T_C=25^\circ C$)	TO-220	P_D	120	W
	TO-251		90	W
	TO-252		136	W
Junction Temperature		T_J	+150	$^\circ C$
Operation and Storage Temperature		T_{STG}	-55 ~ +150	$^\circ C$

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 T_J

3. $L=0.38mH$, $I_{AS}=50A$, $V_{DD}=25V$, $R_G=20\Omega$, Starting $T_J=25^\circ C$

4. $I_{SD} \leq 50A$, $di/dt \leq 300A/\mu s$, $V_{DD} \leq BV_{DSS}$, Starting $T_J=25^\circ C$

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220	θ_{JA}	62	°C/W
	TO-251		62	°C/W
	TO-252		100	°C/W
Junction to Case	TO-220	θ_{JC}	1.24	°C/W
	TO-251		1.28	°C/W
	TO-252		1.1	°C/W

■ ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	60			V
Drain-Source Leakage Current		I_{DSS}	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			100	nA
	Reverse		$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$			-100	nA
Breakdown Voltage Temperature Coefficient		$\Delta BV_{DSS}/\Delta T_J$	$I_D = 250\text{ }\mu\text{A}$, Referenced to 25°C		0.07		V/°C
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 25\text{ A}$		18	23	m Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}$ $f = 1\text{ MHz}$		900	1220	pF
Output Capacitance		C_{OSS}			430	550	pF
Reverse Transfer Capacitance		C_{RSS}			80	100	pF

■ ELECTRICAL CHARACTERISTICS(Cont.)

SWITCHING CHARACTERISTICS							
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD} = 30\text{ V}, I_D = 25\text{ A},$ $R_G = 50\text{ }\Omega$ (Note 1, 2)		40	60		ns
Turn-On Rise Time	t_R			100	200		ns
Turn-Off Delay Time	$t_{D(OFF)}$			90	180		ns
Turn-Off Fall Time	t_F	$V_{DS} = 48\text{ V}, V_{GS} = 10\text{ V}$ $I_D = 50\text{ A}$ (Note 1, 2)		80	160		ns
Total Gate Charge	Q_G			30	40		nC
Gate-Source Charge	Q_{GS}			9.6			nC
Gate-Drain Charge	Q_{GD}			10			nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Drain-Source Diode Forward Voltage	V_{SD}	$I_S = 50\text{ A}, V_{GS} = 0\text{ V}$			1.5		V
Maximum Continuous Drain-Source Diode Forward Current	I_S				50		A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				200		A
Reverse Recovery Time	t_{RR}	$I_S = 50\text{ A}, V_{GS} = 0\text{ V}$		54			ns
Reverse Recovery Charge	Q_{RR}	$dI_F / dt = 100\text{ A}/\mu\text{s}$		81			μC

Notes: 1. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$
 2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

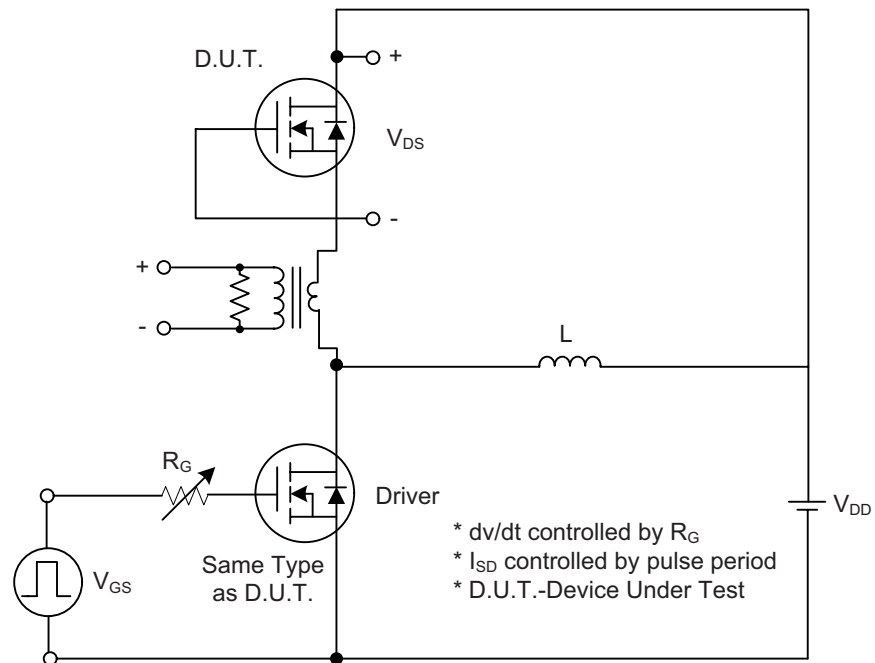


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

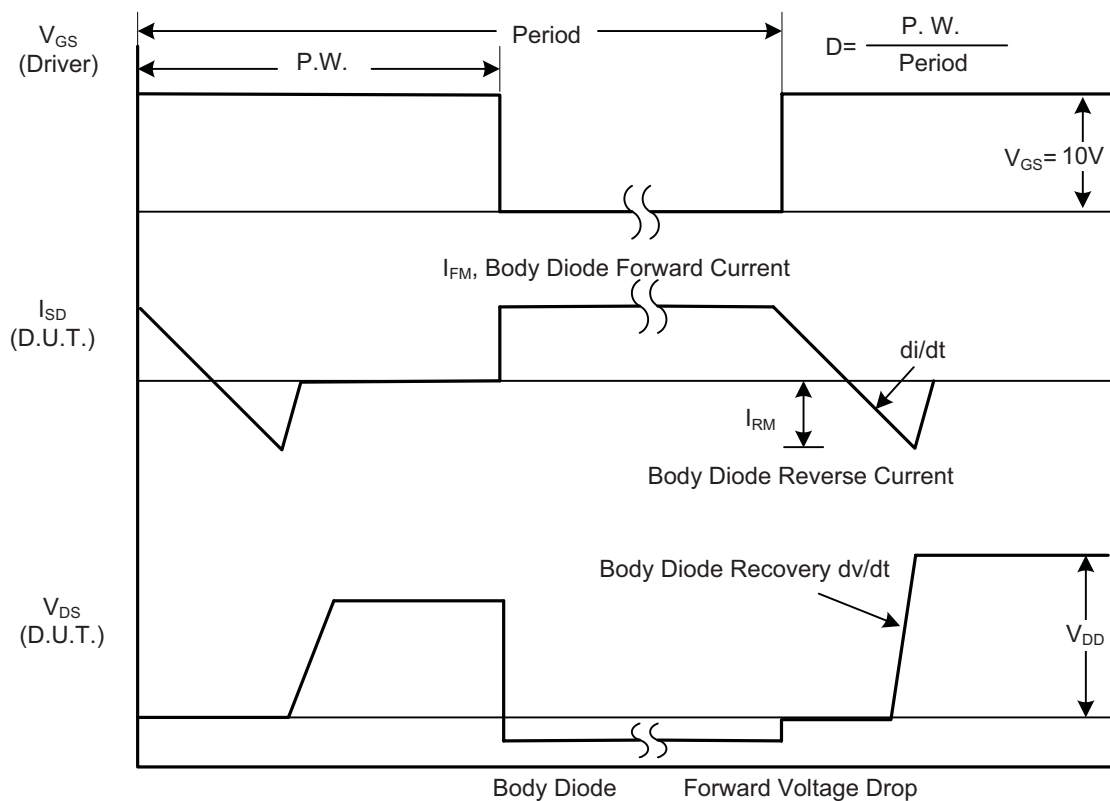


Fig. 1B Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

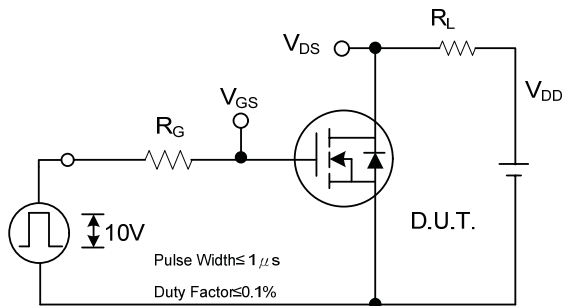


Fig. 2A Switching Test Circuit

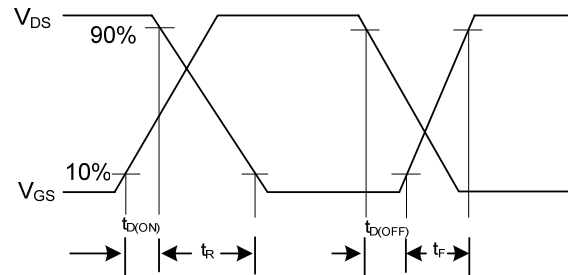


Fig. 2B Switching Waveforms

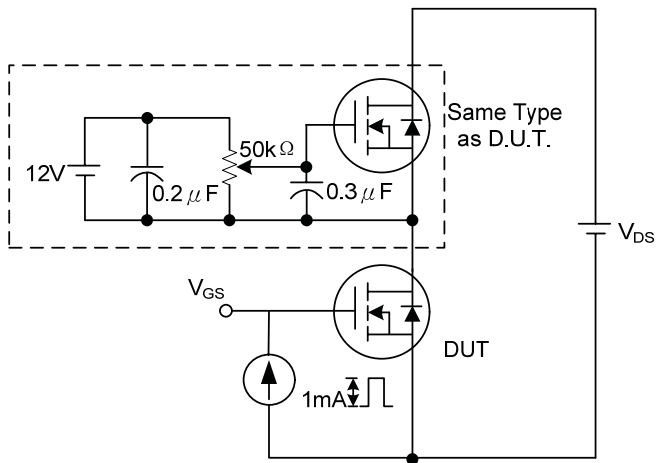


Fig. 3A Gate Charge Test Circuit

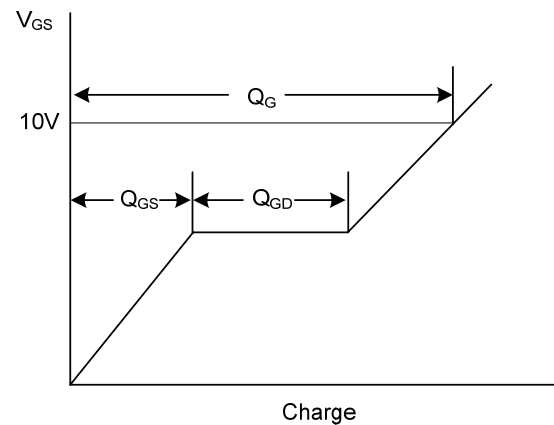


Fig. 3B Gate Charge Waveform

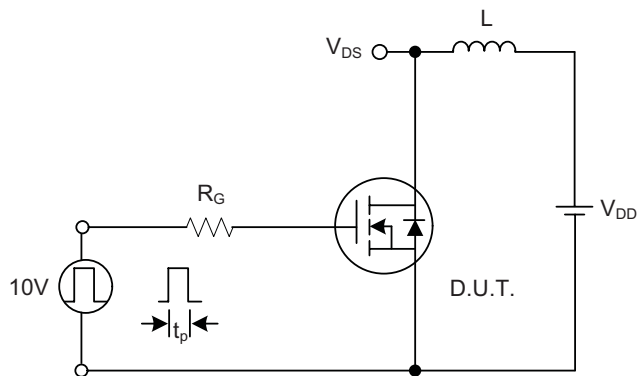


Fig. 4A Unclamped Inductive Switching Test Circuit

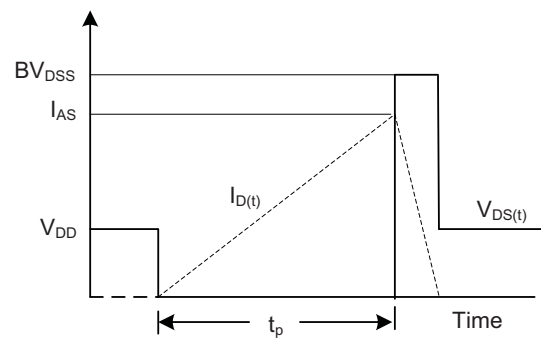
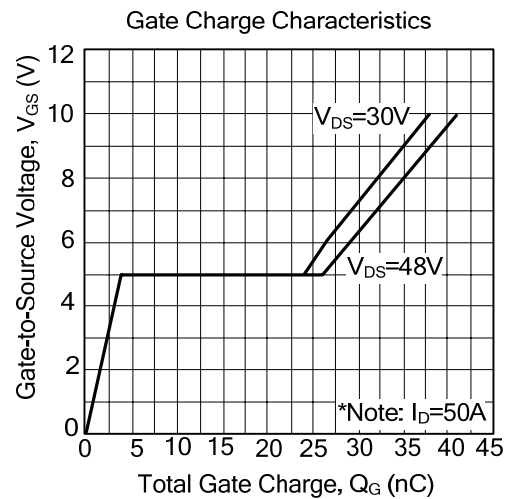
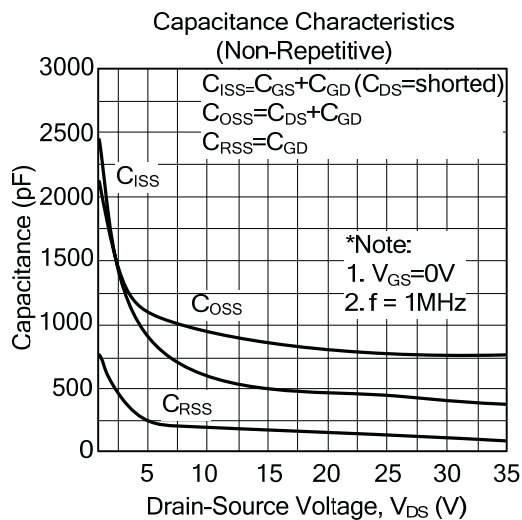
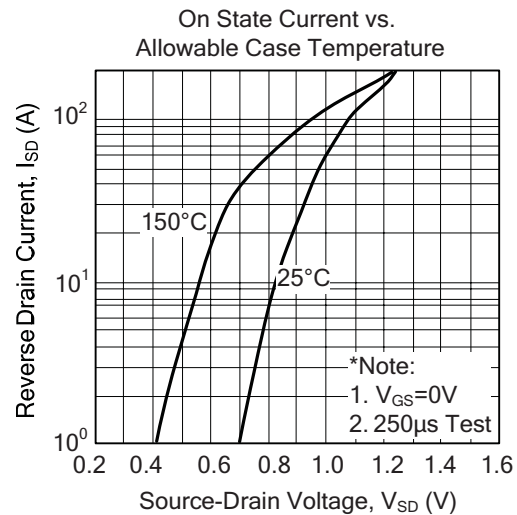
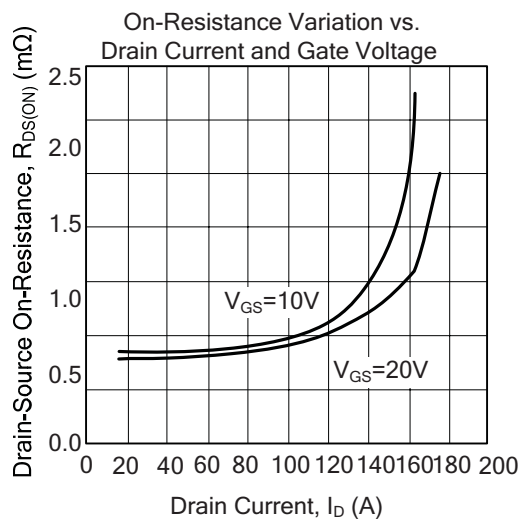
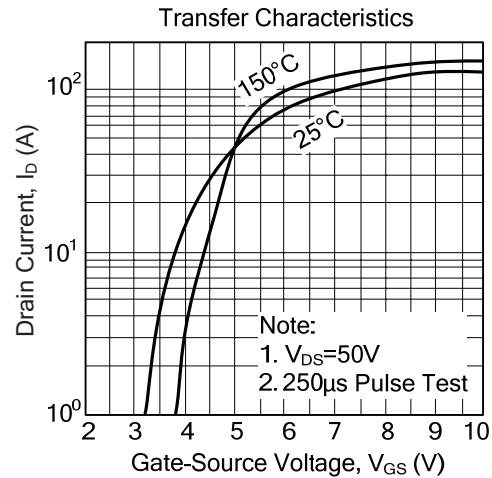
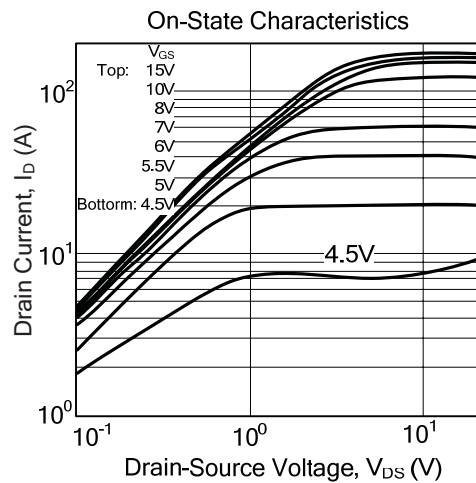


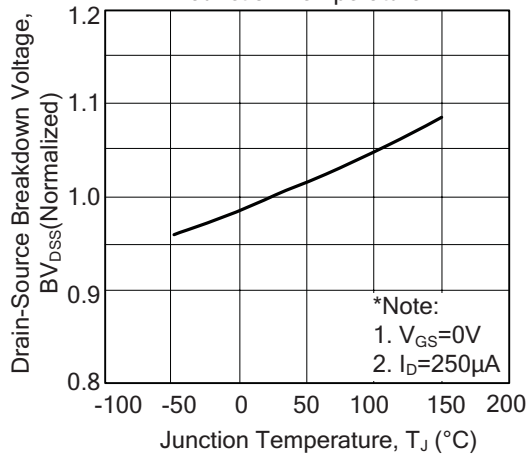
Fig. 4B Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

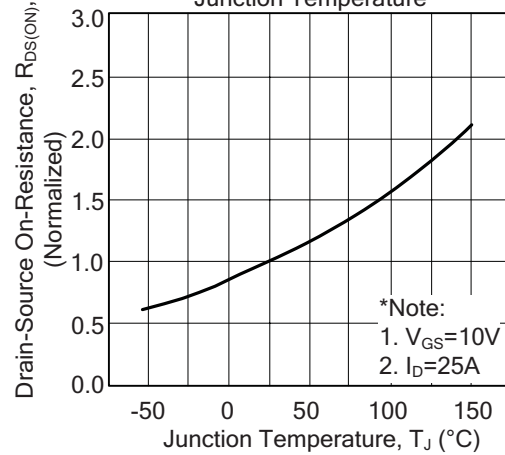


■ TYPICAL CHARACTERISTICS(Cont.)

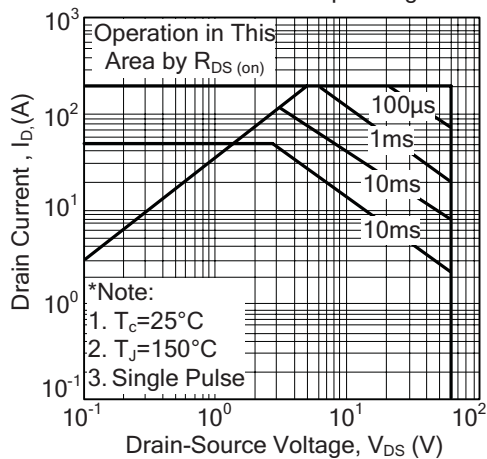
Breakdown Voltage Variation vs.
Junction Temperature



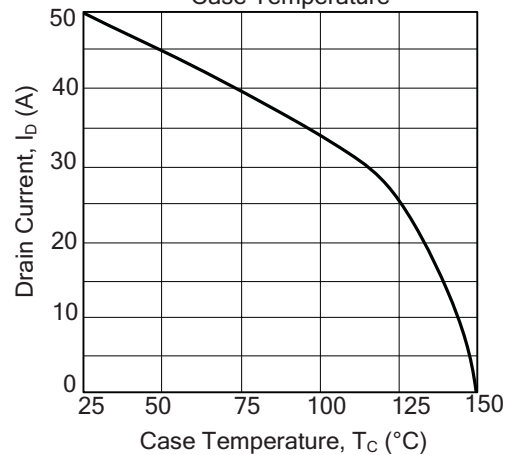
On-Resistance Variation vs.
Junction Temperature



Maximum Safe Operating



Maximum Drain Current vs.
Case Temperature



Transient Thermal
Response Curve

