DATA SHEET

NEC

MOS FIELD EFFECT TRANSISTOR

2SK2481

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

The 2SK2481 is N-Channel MOS Field Effect Transistor designed for high voltage switching applications.

FEATURES

- Low On-Resistance
  $R_{DS(on)} = 4.0\ \Omega$ ($V_{GS} = 10$ V, $I_D = 2.0$ A)
- Low C_{iss} $C_{iss} = 900$ pF TYP.
- High Avalanche Capability Ratings

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ ˚C)

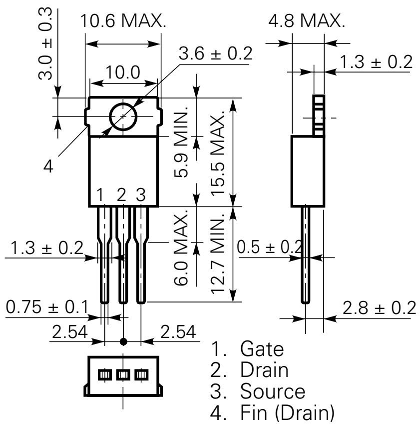
Drain to Source Voltage	V_{DSS}	900	V
Gate to Source Voltage	V_{GSS}	±30	V
Drain Current (DC)	$I_{D(DC)}$	±4.0	A
Drain Current (pulse)*	$I_{D(pulse)}$	±12	A
Total Power Dissipation ($T_c = 25$ ˚C)	P_{T1}	70	W
Total Power Dissipation ($T_A = 25$ ˚C)	P_{T2}	1.5	W
Channel Temperature	T_{ch}	150	˚C
Storage Temperature	T_{stg}	–55 to +150	˚C
Single Avalanche Current**	I_{AS}	4.0	A
Single Avalanche Energy**	E_{AS}	65.9	mJ

* PW ≤ 10 μs, Duty Cycle ≤ 1 %

** Starting $T_{ch} = 25$ ˚C, $R_G = 25\ \Omega$, $V_{GS} = 20\ \text{V} \rightarrow 0$

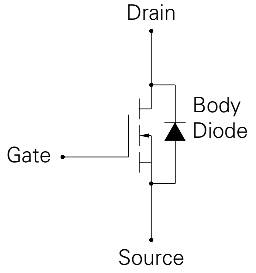
PACKAGE DIMENSIONS

(in millimeters)



1. Gate
2. Drain
3. Source
4. Fin (Drain)
JEDEC: TO-220AB

MP-25 (TO-220)



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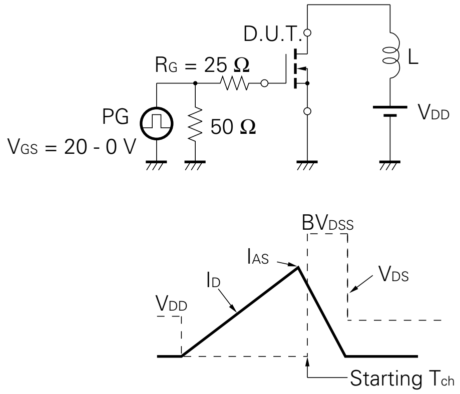
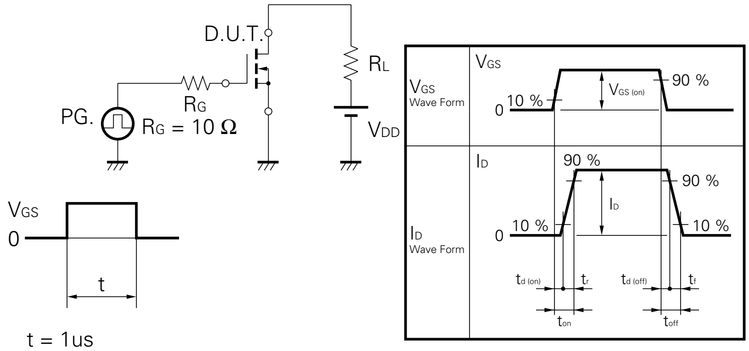
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source On-State Resistance	$R_{DS(on)}$		3.2	4.0	Ω	V_{GS} = 10 V, I_D = 2.0 A
Gate to Source Cutoff Voltage	$V_{GS(off)}$	2.5		3.5	V	V_{DS} = 10 V, I_D = 1 mA
Forward Transfer Admittance	$\mid y_{fs} \mid$	1.0			S	V_{DS} = 20 V, I_D = 2.0 A
Drain Leakage Current	I_{DSS}			100	μA	V_{DS} = V_{DSS}, V_{GS} = 0
Gate to Source Leakage Current	I_{GSS}			±100	nA	V_{GS} = ±30 V, V_{DS} = 0
Input Capacitance	C_{iss}		900		pF	V_{DS} = 10 V
Output Capacitance	C_{oss}		130		pF	V_{GS} = 0
Reverse Transfer Capacitance	C_{rss}		25		pF	f = 1 MHz
Turn-On Delay Time	$t_{d(on)}$		17		ns	I_D = 2.0 A
Rise Time	t_r		7		ns	V_{GS} = 10 V
Turn-Off Delay Time	$t_{d(off)}$		63		ns	V_{DD} = 150 V
Fall Time	t_f		8		ns	R_G = 10 Ω
Total Gate Charge	Q_G		30		nC	I_D = 4.0 A
Gate to Source Charge	Q_{GS}		5		nC	V_{DD} = 450 V
Gate to Drain Charge	Q_{GD}		13		nC	V_{GS} = 10 V
Body Diode Forward Voltage	$V_{F(S-D)}$		1.0		V	I_F = 4.0 A, V_{GS} = 0
Reverse Recovery Time	t_{rr}		710		ns	I_F = 4.0 A, V_{GS} = 0
Reverse Recovery Charge	Q_{rr}		3.5		μC	di/dt = 50 A/μs

Test Circuit 1 Avalanche Capability

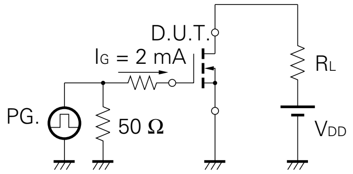


Test Circuit 2 Switching Time



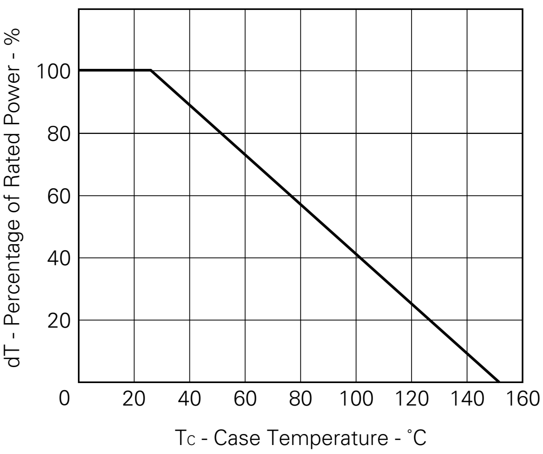
t = 1us
Duty Cycle ≤ 1 %

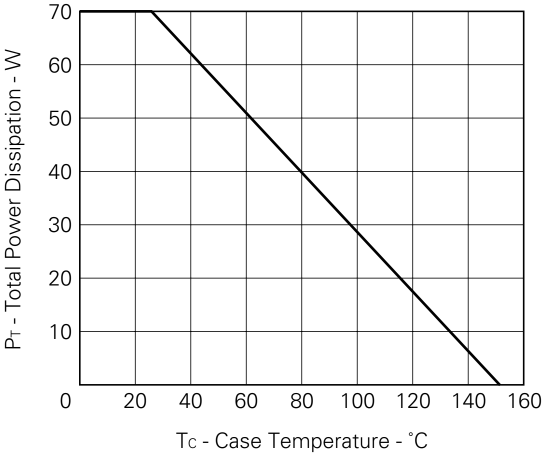
Test Circuit 3 Gate Charge

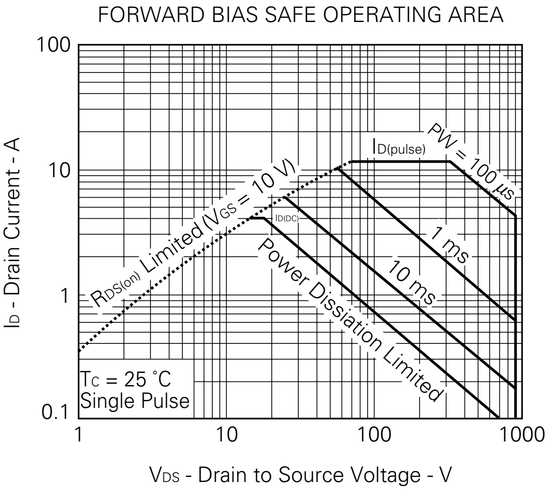


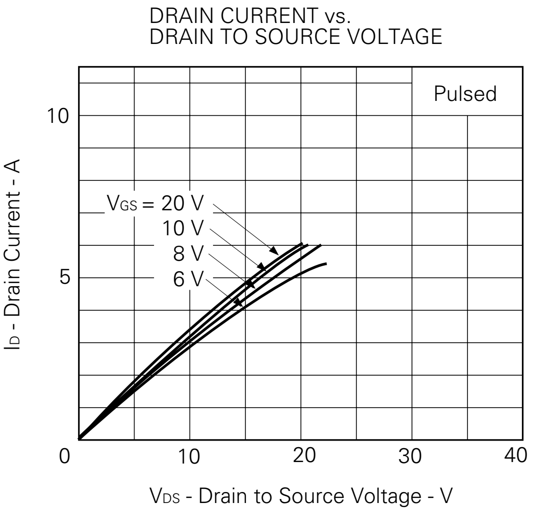
The application circuits and their parameters are for references only and are not intended for use in actual design-in's.

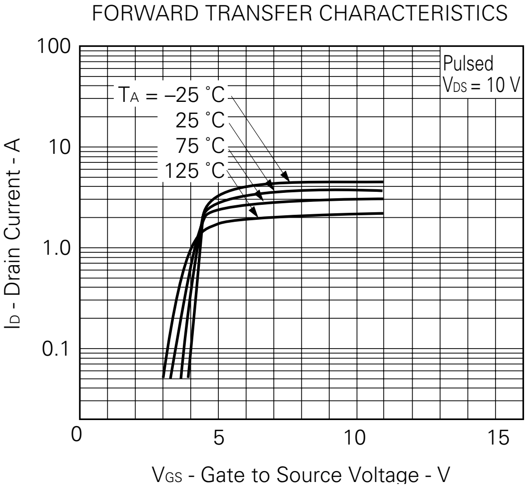
TYPICAL CHARACTERISTICS (TA = 25 °C)


DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA

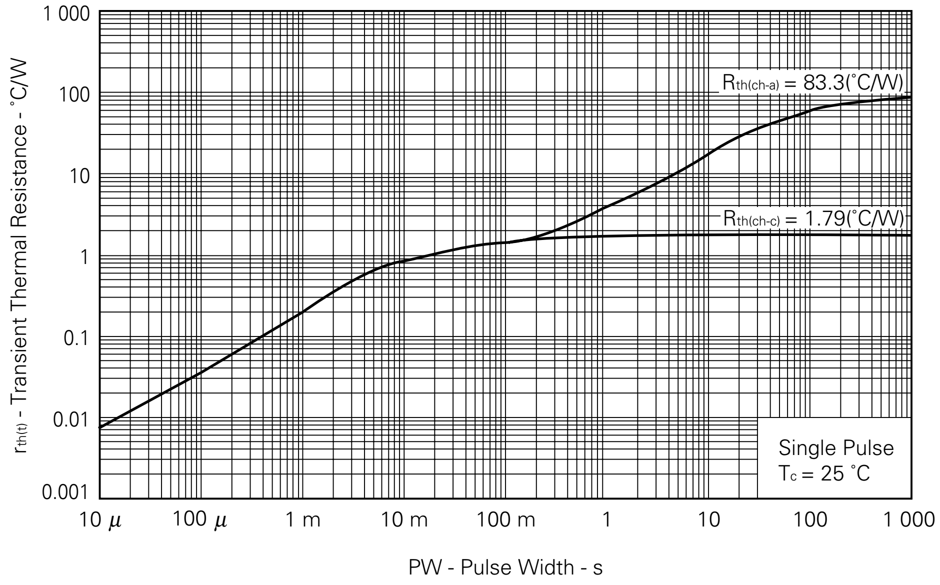

TOTAL POWER DISSIPATION vs. CASE TEMPERATURE


FORWARD BIAS SAFE OPERATING AREA

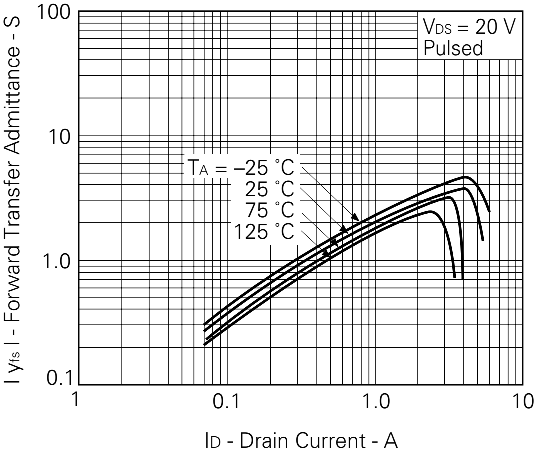

DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE


FORWARD TRANSFER CHARACTERISTICS

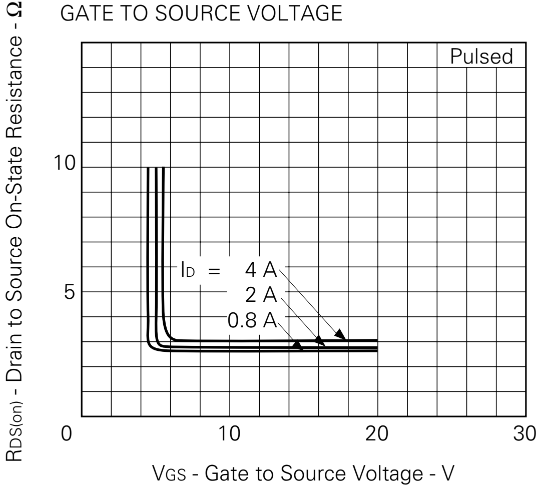
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



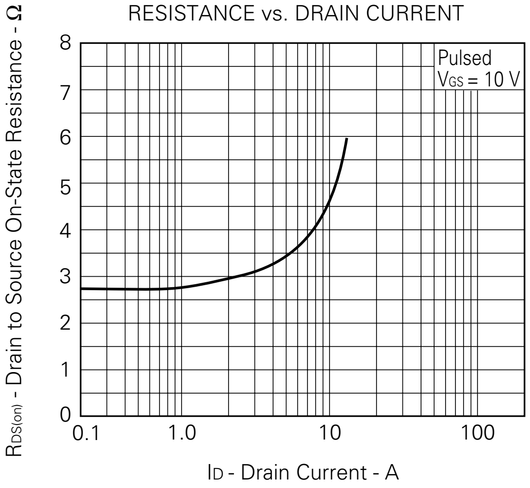
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



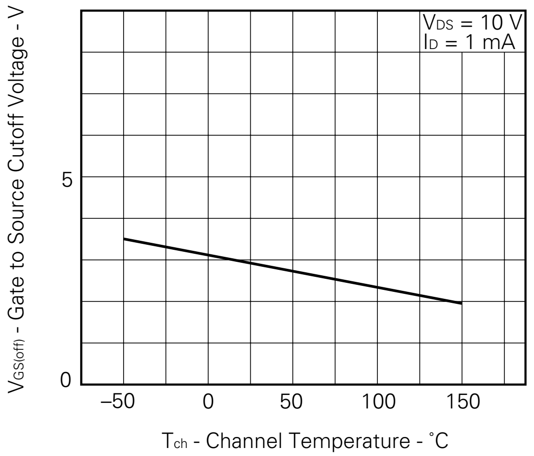
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



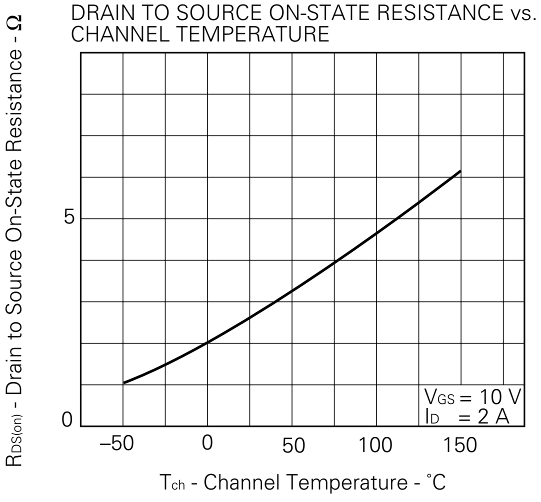
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



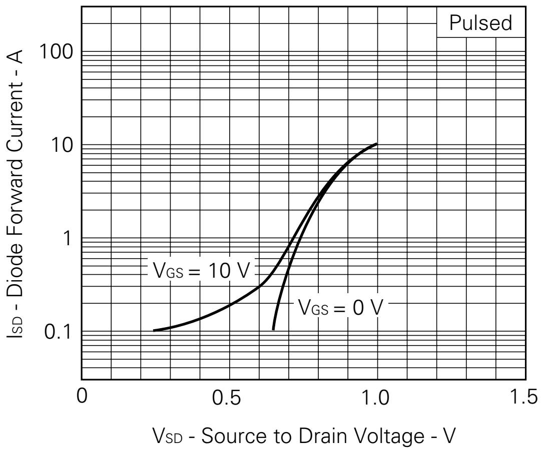
GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



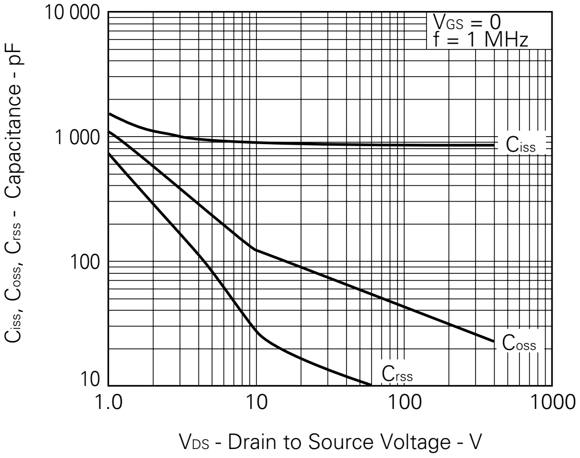
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



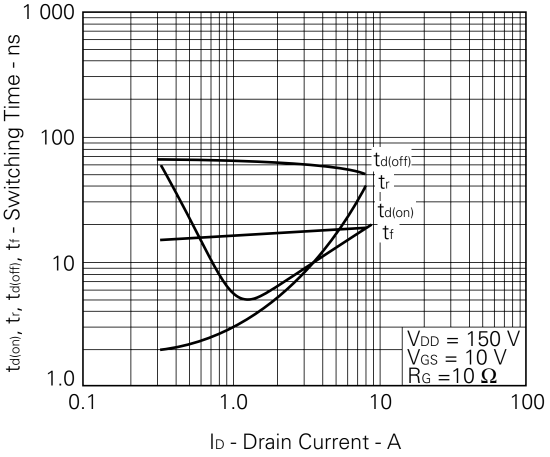
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



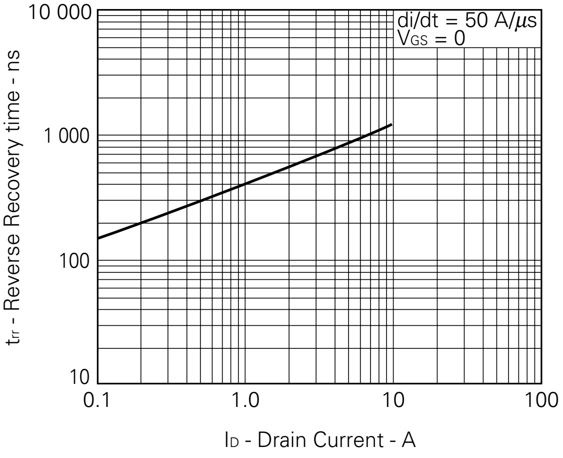
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



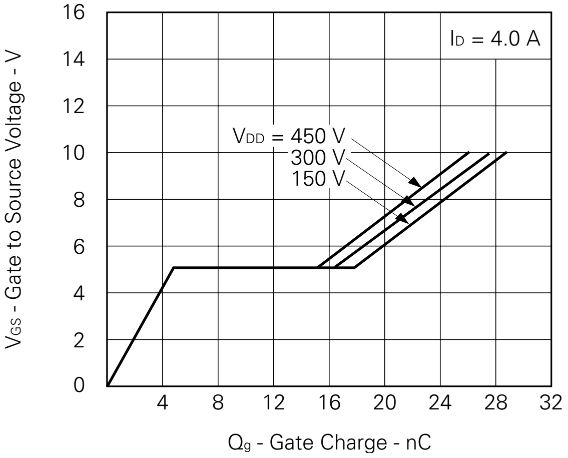
SWITCHING CHARACTERISTICS



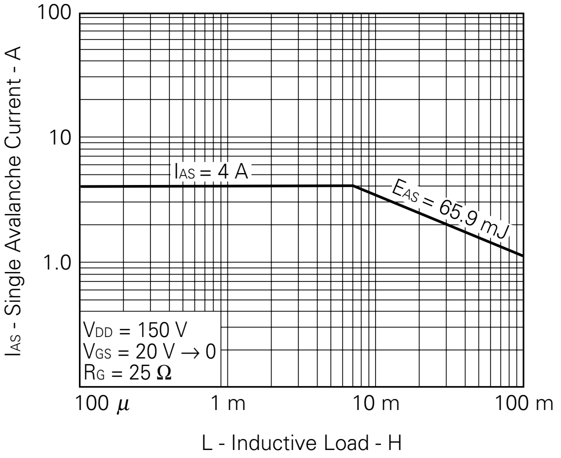
REVERSE RECOVERY TIME vs. DRAIN CURRENT



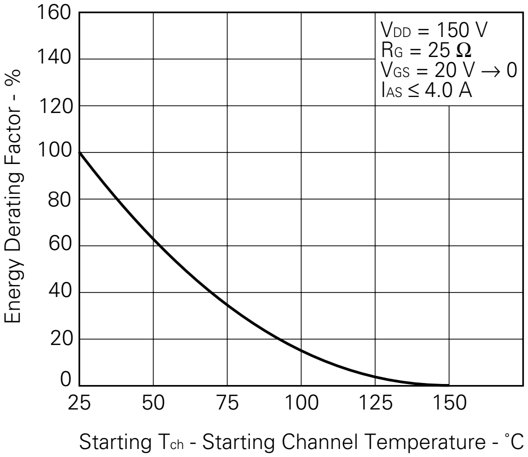
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SINGLE AVALANCHE CURRENT vs.
INDUCTIVE LOAD



SINGLE AVALANCHE ENERGY
DERATING FACTOR



REFERENCE

Document Name	Document No.
NEC semiconductor device reliability/quality control system.	TEI-1202
Quality grade on NEC semiconductor devices.	IEI-1209
Semiconductor device mounting technology manual.	IEI-1207
Semiconductor device package manual.	IEI-1213
Guide to quality assurance for semiconductor devices.	MEI-1202
Semiconductor selection guide.	MF-1134
Power MOS FET features and application switching power supply.	TEA-1034
Application circuits using Power MOS FET.	TEA-1035
Safe operating area of Power MOS FET.	TEA-1037

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